



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

26 FEDERAL PLAZA

NEW YORK NEW YORK 10278

CINNAMINSON GROUND WATER CONTAMINATION SUPERFUND SITE

SIGN-IN SHEET

PLEASE BE SURE TO PRINT YOUR NAME AND ADDRESS CLEARLY SO THAT WE CAN ADD YOU TO OUR MAILING LIST:

NAME

ADDRESS

William A. Hess	304 Plantation Rd
Phyllis Hess	
Mark Hezberg	30 HARVEY ST NEW BRUNSWICK, NJ 08901
WALTER TRUMFELT	BURL. CO. HEALTH DEPT, WOODLAND RD, MT HOLLY DEL
Bob Hess	1000 UNION RD.
GEORGE ROGERS	2409 CANAL DR. CINN. NJ 08077
Robert L. Fischer	714 HILTOP RD CINN. NJ 08077
EDWARD L. JORDAN, JR	301 GERRARD DR CINNAMINSON NJ 08077
LEO MOLTZ	106 LACON AVE DELERON, N.J. 08075
on BEAT	Cinnam. in Top Engineer - Municipal Bldg.
Richard C Strubel, Esq	2306 Laurel Lane Cinnam. 08077
J. JAKITZWICZ	Burlington County Times, Rt. 130 Millburg, NJ
V. Pulsifer	Taylor's Lane Cinnam. NJ 08077-08041
J. Lubitsky	2210 CLARK L. CINN. N.J. 08077
Kathleen Glick	2407 Hylan Rd. Cinn. NJ 08077
JOHN T. REILLY	P.O. Box 321 Cinnam. NJ 08077-0421
FRANK J. VOIRUS	REPRESENTING SET 3379 Street Rd Lansdale PA 19040
Kathleen Kreis	Piney Hiding Kipp's Church 163 Madison Ave Morristown NJ 07960



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

26 FEDERAL PLAZA

NEW YORK NEW YORK 10278

CINNAMINSON GROUND WATER CONTAMINATION SUPERFUND SITE

SIGN-IN SHEET

PLEASE BE SURE TO PRINT YOUR NAME AND ADDRESS CLEARLY SO THAT WE CAN ADD YOU TO OUR MAILING LIST:

NAME	ADDRESS
Frank E. Osowski	Cinnaminson Twp 1621 MANOR Rd Cinnaminson NJ 08047
FRANK A HAMEL JR	DEL VAL INK
Christopher M. Mancini (Cinnaminson)	1301 TAYLOR RIVERTON NJ 08077
FREDA LISA	5300 Cherry Hill NJ 08034
DAVID MARINO	Burlington Co. Health Dept, Lakeside Rd Mt. Holly, NJ 08060
GEORGE LAIGALE	112 Shevanden Rd
LES SCHEVITZ	1222 LAUREL OAK RD, SUITE 175 Voorhees, NJ 08043
Donna M. Sloan	431 N LATCH'S LN. MERION PA 19066
Theresa M. Sloan	70 E 272
Theresa M. Sloan	2000 LANSING & RIVER RD E RIVINGTON NJ 08077
Theresa M. Sloan	New Jersey
Theresa M. Sloan	700 PHILADELPHIA SUITE 108 Cinnaminson NJ 08047
Theresa M. Sloan	3000 Church Rd Cinnaminson NJ 08047
BOB W MYERS	25 WOODSIDE LA CINNAMINSON NJ 08047
NANCY MYERS	" " " "
Daniel J. Iacovelli	603 Hilltop Rd Cinnaminson NJ 08047
GARY CRAWFORD	5 DORSET DR MARLTON, NJ 08053
Jack KUNZ	38 KENT AVE MARLTON, NJ 08053
Joe & Laura Taylor	Taylor's Lane Cinnaminson N.J. 08047
Jim & Mrs J A Flentz	12334 Riverbend Rd

Cinnaminson

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Summary

The USEPA Environmental Protection Agency (USEPA) conducted a remedial investigation (RI) and Feasibility Study (FS) of an area in Cinnaminson, New Jersey bounded by Union Landings Road, River Road, Taylor's Lane, and Route 130. The Cinnaminson Study Area encompasses approximately 400 acres (160 hectares) and lies approximately 5000 ft (1500 m) southeast of the Delaware River. The USEPA RI was performed by Camp, Dresser, and McKee [1989]. The USEPA FS was performed by ICF Technology [1989]. Numerous additional site studies and investigations were performed from 1983 to 1989. The results of the USEPA FS were summarized in the Proposed Plan (Plan) for the Cinnaminson Study Area [1990].

GeoServices was asked by Sanitary Landfill, Inc. (SLI) to review the USEPA RI and FS and other pertinent documents and to prepare a report assessing the implementation of the Preferred Remedial Alternative, as described in the Plan. The purpose of the study was to determine if the USEPA RI and FS were consistent with the CERCLA statutory requirements, the requirements set forth in USEPA RI/FS guidance documents, and to determine if the Preferred Remedial Alternative would satisfy the primary objective of a remedial program [40 CFR 300.430(e)(9)(A)], i.e., to protect human health and the environment.

7.2 Conclusions

Based on a review of available site data and information, and a review of the USEPA RI, USEPA FS, and the Plan, GeoServices has concluded the following:

General Comments of Ford Electronics and Refrigeration Corporation (FERCO) to the Proposed Plan, Final Remedial Investigation Report, and Final Feasibility Study Report for the Cinnaminson Ground Water Contamination Site in Burlington County, New Jersey.

1. FERCO is not persuaded that a state ARAR exists that would necessitate pumping and treating the "shallow aquifer". The Proposed Plan, Final Remedial Investigation Report, and Final Feasibility Study Report reference a "regional aquifer" with perched water above flowing into it (lower aquifer). Thus, much of the proposed remedy (MM-5C) which includes pumping and treating the perched waters in addition to the lower aquifer is unnecessary, wasteful, and not legally required. If ground water pumping and treatment is warranted, only the lower aquifer should be extracted for treatment.
2. Inadequate consideration appears to have been given to "soil flushing" technology as a potentially quicker and more cost-effective remedy. Why install a comprehensive RCRA performance cap, thereby entombing the wastes and limiting leachate otherwise available for collection and treatment? Allowing percolation of the waste could result in a more effective remedy, since beneficial, natural chemical and biological reactions would be enhanced.
3. The proposed remedy refers to chemical precipitation of inorganics. FERCO is unconvinced that the very dilute levels indicated are treatable by conventional chemical precipitation techniques. In addition, the inorganics identified may not reflect other than naturally occurring levels found elsewhere in the region. If the Remedial Investigation indicates that the regional aquifer is contaminated with organic constituents, that aquifer should be extracted and treated for organics. Further complicating groundwater treatment by also requiring chemical precipitation of inorganics is not warranted.
4. The Proposed Plan assumes that the sludges generated by all of the treatment options would be considered hazardous waste and would have to be so managed for the duration of remedial activities. ~~The basis for this conclusion is not indicated.~~ FERCO disagrees that any such sludges would necessarily be considered hazardous either as a listed waste or by analysis as a characteristic waste.
5. Inadequate consideration appears to have been given in developing the Proposed Plan to implementing source-specific remediation at sites, other than the Cinnaminson Landfill, which are also contributing sources to the ground water contamination. Other contributing sources should have been given greater attention throughout the RI/FS process.

July 30, 1990



Office of the General Counsel

Ford Motor Company
Parklane Towers West, Suite 401
One Parklane Boulevard
Dearborn, Michigan 48126

July 30, 1990

VIA FEDERAL EXPRESS

U.S. Environmental Protection Agency
New Jersey Remedial Action Branch
26 Federal Plaza, Room 711
New York, New York 10278
Attn: Mr. Trevor Anderson

Cinnaminson Ground Water Contamination Site
Burlington County, New Jersey

Dear Mr. Anderson:

In response to your letter of June 14, 1990, enclosed are Ford Electronics and Refrigeration Corporation's comments on the Proposed Plan, Final Remedial Investigation Report and Final Feasibility Study Report for the Cinnaminson Ground Water Contamination Site in Burlington County, New Jersey.

If you have questions or need additional information, please let me know. I may be contacted by mail at the above address, by telephone at (313) 322-1966 or by facsimile transmission at (313) 390-3063.

Sincerely,

Robert E. Costello
Senior Attorney

rec/bg
enclosure

Mr. Trevor Anderson
June 11, 1990
Page 3

Trevor, once again, thanks for the opportunity to offer comments on this remedial project for the Cinnaminson landfill and if you need any additional information or would like to discuss any of these items further, do not hesitate to give me a call. When you have developed a response to these items, please send them to me so that I may review them with the New Jersey-American Water Company staff.

Very truly yours,


A. D. Marino

kc

cc: L. W. Brockaw
K. T. Wragg
Mayor Lawrence Eleuteri, Cinnaminson Township
Barker Hamill, NJDEP

at Chester Avenue next to the municipal building and our two wells at New Albany Road, our two wells at Pomona Road, and our two wells at Steven's Drive Station, we most definitely have a significant impact on the deep aquifer in that area. The water levels that have been obtained from all the existing monitoring wells do not reflect our true operation only an effort by the water company to modify its withdrawal pattern to minimize the leachate of material from the landfill toward its production wells. These considerations must be worked into a new model or revise the existing groundwater model.

2. When the existing monitoring wells were installed, PVC casing and screening were used. Because of the solvents present in the groundwater, some of the contamination detected from the samples collected from these monitoring wells may be influenced by the PVC casing and screen. All new monitoring wells should be constructed with materials that will not influence the integrity of the groundwater sample.

Future Operational Considerations

1. Because of the nature of technology being utilized for the groundwater cleanup and that the discharge from the on-site treatment plant is going to be injected into the aquifer, New Jersey-American Water Company requests permission to have access to the site for the purpose of collecting samples of the water being discharged into the aquifer. New Jersey Department of Environmental Protection regulations require that if treatment equipment is installed for the purpose of removing volatile organic compounds from water, that monitoring be conducted twice a month, on two week intervals, to evaluate the effectiveness of the removal process. We feel that this requirement should apply.
2. Since the quality of water in the production wells of New Jersey-American are free from any volatile contamination, the quality of the discharge water from this treatment plant should be the same as the wells, or at worst, meet the maximum contaminant levels as established by New Jersey Department of Environmental Protection for potable drinking water.
3. Although it is implied by the nature of this remedial action, no where is it stated that every effort will be made to protect New Jersey-American wells from future contamination nor what will transpire when the contaminant plume reaches these locations. Will New Jersey-American be eligible for superfund cleanup money or remedial treatment of these wells if the contaminant plume reaches the New Jersey-American wells prior to the Tri-County Regional Water Supply Project coming on line?



American Water Works Service Co., Inc.

Eastern Region • 500 Grove Street • Haddon Heights, NJ 08035

(609) 547-3211

A. D. Marino
Director-Water Quality Control
(609) 546-2234

June 11, 1990

CERTIFIED MAIL #P428664892
RETURN RECEIPT REQUESTED

Mr. Trevor Anderson
Chemical/Environmental Engineer
U.S. Environmental Protection Agency
Region II
Emergency and Remedial Response Division
26 Federal Plaza, Room 711
New York, NY 01278

Dear Trevor:

First, I would like to thank you for extending to the representatives of New Jersey-American Water Company and myself the opportunity to meet with your project team to discuss the remedial action at the Cinnaminson landfill. As I mentioned during that meeting and again at the public meeting, there are certain operational conditions regarding the New Jersey-American Water Company operation that you must be aware of in order for your remedial project to be completely effective. In addition to the operational concerns, I have a few other concerns that I would like to address in this letter that should be viewed as formal comments regarding this plan that should be addressed prior to the record of decision being signed. As Regional Director of Water Quality Control, I am offering these comments on behalf of New Jersey-American Water Company. The comments will be categorized into existing operational concerns and future operational considerations.

Existing Operational Concerns

1. Before the collection wells and the discharge wells are sited for this remedial project, a groundwater model must be created to reflect what is actually going on within the deep aquifer. The existing information that you have regarding the movement of water through the aquifer from the existing monitoring wells located on the site has most certainly been skewed by our operating criteria for our Cinnaminson wells. Because of the location of the landfill and proximity to our groundwater sources at New Albany Road and Pomona Road, we have altered our operation to reduce the output from these locations. This action has reduced the regional cone of depression at each site thus reducing the radius of influence. When all of our wells in that area are operating, including our two wells

SYLVIA E & JOSEPH H. TAYLOR

RIVER SIDE HOMESTEAD FARM

TAYLORS LANE

~~WINDY HILL~~ N. J. 08077

Cinnaminson

July 12, 1990

Trevor Anderson
US-EPA, Region II
26 Federal Plaza, Room 711
New York, NY 10278

Dear Trevor Anderson:

Following up on the May 31, 1990 meeting we both attended at the Cinnaminson Township Community Center, I wish to make the following comments:

A) I call on you and the federal EPA to include five wells in your monitoring process. These wells are all within 1/2 mile of the site you are covering. They belong to and are used regularly for potable and household use by 30 or more adults and children - members of our family and neighboring families. These wells are located as follows on:

- 1 - Block 201, Lot 2
- 2 - Block 201, Lot 3
- 3 - Block 201, Lot 4
- 4 & 5 - Block 201, Lot 1.01

Note: For two of these wells I do have "Water Quality Analyses" dated July 14, 1987:

RECORD NUMBER ----- 98601128
STATION NUMBER ----- 400145075593601
STATION NAME ----- 1
(probably Block 201, Lot 3)
DATE OF COLLECTION - 06-05-1986 1100

RECORD NUMBER ----- 98600981
STATION NUMBER ----- 400147074593401
STATION NAME ----- TAYLOR 2
(probably one of two on Block 201, Lot 1.01)
DATE OF COLLECTION - 06-05-1986 1515

B) I call on you and other proper authorities to do all in your power to get the owners of the landfill located between Taylors Lane and Union Landing Road to pay a large share of the cost of your work. There is no reason for all of this cost to be borne by taxpayers!

I trust you will be able to grant these requests.

Sincerely yours,

Joseph H. Taylor

Mr. Trevor Anderson
U.S. E.P.A.
26 Federal Plaza
N.Y., N.Y. 10278

June 1, 1990

Dear Mr. Anderson,

I live with my wife and 4 children on Taylor's Farm at the foot of Taylor's Lane on the Delaware River in Cinnaminson, New Jersey.

Our potable well along with 3 other potable wells that service our immediate neighbors are all within 1/2 mile of the Cinnaminson groundwater contamination site that your agency is currently in the process of cleaning up.

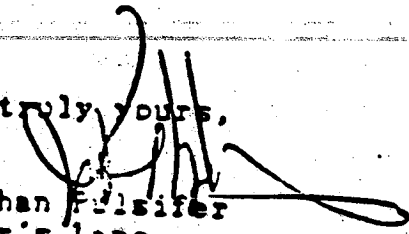
At a public meeting held at the Cinnaminson Community Center on May 31, 1990, you asked for public comment concerning the clean up process.

I feel very strongly that the E.P.A. should include our wells along with all other potable wells within a given radius in an ongoing monitoring program. Results of such monitoring should be mailed to all residents consuming water from potable wells within the monitoring zone on a regular basis.

I assure you intend to continue monitoring your own test wells. Testing and monitoring of the surrounding potable wells, at the same time, would not be terribly expensive.

I look forward to your response.

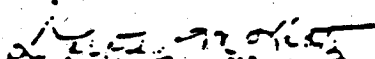
Very truly yours,


Jonathan Felsifer
Taylor's Lane
Cinnaminson, NJ 08077

- 26) What remedial action is planned for Smythwycke? And how will that Cleanup affect both the Cinnaminson project and the proposed cleanup for Pennsauken?
- 27) Is there a grand plan or coordinating effort to protect overall health and welfare of our communities in regards to all the contaminated sites in the area (Cinn., Pennsauken, Swope, etc.).
- 28) While I am in favor of the cleanup, what preventative measures will be taken to allow permanent recharge to the aquifer without further contamination?
- 29) Will there be any restrictions placed on industrial growth or housing developments in the Tri-boro area?

In conclusion, I hope a safe and effective procedure can be implemented in the very near future. I hope we can learn from our past and costly mistakes and that we have the wisdom and the courage to take the necessary action to develop the best and most responsible way of handling our waste. Intense recycling, composting, source reduction, the elimination of hazardous chemicals and most importantly education is the key to our success. It is my opinion and that of many scientist and lawmakers that incineration can only compound the problems we now face in Superfund cleanups.

Respectfully yours,


Dorothy W. Klotz

cc: Mr. Walter Engle
Mayor of Riverton

ACCP
P.C. Box 145
Fairview, NJ 08005

- 10) How many gallons of water per day will be taken from the 130 wells?
- 11) How many from the other seven wells required for the regional aquifer?
- 12) Will there be more wells needed for the regional aquifer?
- 13) What influence will the draw from these wells have on the drinking supply wells located 2 miles south?
- 14) What influence will these extraction wells have on the Delaware river since they are hydraulically connected?
- 15) Regarding risk from ingestion of groundwater from the perched water zones, do local farmers water from the perched aquifer or regional?
- 16) What health risk analysis have been done on absorption via the skin of the groundwater from the perched or regional aquifer?
- 17) At what velocity does the plume travel?
- 18) Under Administration Controls, a general warning is to be placed on new well installations for potable water, would the general public be notified through the mail or as a special notice on their bills?
- 19) Under MM-3, MM-4 (MM-5C) will there be on-site treatment? If so, how much and what type of construction would take place?
- 20) How would this affect the contamination plume?
- 21) Under Section C: Chemical precipitation/biological granular activated carbon:
 - 1. Is the chemical precipitation controlled?
 - 2. What chemicals would be used and what airborne particulates would be emitted?
- 22) What constitutes a waiver for APAR? And who grants such a waiver?
- 23) The EPA has preferred MM-5C. Does that fill the requirement of acceptance? Would there be any modifications to this alternative and would the public be notified?
- 24) Is the cost of cleanup fixed or will it escalate during the 30 year duration?
- 25) What effect does the soil contamination at the Smythwycke development located at Church & Forkland Rd have on the local drinking supply wells.

June 13, 1990

D.M. Klotz
621 Elm Terrace
Piverton, NJ 08077
(609) 829-7562

Mr. Trevor Anderson
Remedial Project Manager
U.S. Environmental Protection Agency
Room 711
26 Federal Plaza
New York, New York 10278

Dear Mr. Anderson,

Thank you for this opportunity to write in comments and inquiries pertaining to the cleanup of the Superfund Site at the old SLI landfill located in Cinnarinson, New Jersey.

I am a resident of Piverton and the subject of groundwater contamination in the area is a very real concern. Unfortunately, I was unable to attend the public meetings on May 31st and June 1 and therefore, I would like to submit the following questions:

- 1) Which company will be selected to do the overall cleanup?
- 2) If it is Wastewatermanagement or a subsidiary, how do you justify naming them the work?
- 3) What department(s) in the NJDEP will be supporting the FF?
- 4) Is there any coordination among NJDEP's Water Resources, Allocations, Hazardous Wastes, etc?
- 5) Since the Petroleum underground storage tanks will not be addressed under this Plan, when will they be addressed?
- 6) Will there be a separate public hearing?
- 7) Will there be added cost?
- 8) According to Corp, Dresser & McKee (CDM) contamination is in both the shallow and regional (PRM) aquifer. What do you estimate the cone of influence to be?
- 9) The SLI Superfund site has many of the same characteristics and background history as the Pennsauken Landfill located on River Road including the same contamination. The Pennsauken site is also supposed to undergo remedial cleanup as well. Is there any coordination between NJDEP and EPA pertaining to these two sites? If wells are needed for the Pennsauken site, what affect will these wells have on the Cinnarinson cleanup or water supply wells in the area?

...1/

• Ground Water Sampling and Analysis

Ground water quality sampling and analysis was conducted to determine the source (s) and extent of ground water contamination. Samples were collected from previously installed, and newly installed monitoring wells. In summary, the hydrogeologic and ground water data indicated that the two SLI landfills are the major sources of ground water contamination. The extent of contamination appeared to be limited to an area within close proximity of the two landfills and was not present south of US Route 130.

SUMMARY OF RESULTS

The remedial investigation report identified several potential sources of ground water contamination. The report concluded that the SLI Landfill was the major source of ground water contamination. Del-Val Ink and Color, L & L Redi-Mix, and Hoeganaes Corporation were identified as other possible sources. The potential ground water contamination sources on these properties include an unlined landfill, underground storage tanks, unlined slurry pits, septic systems and cooling ponds.

The contaminants in the upper and lower zones consist of the volatile organic compounds benzene, ethylbenzene, 1,2-dichloroethane, xylenes, chlorobenzene, trichloroethene, and vinyl chloride, among others. Inorganic contamination includes elements such as arsenic, beryllium, cadmium, and cyanide. The contamination in the regional aquifer flows in a south - southeasterly direction. The contamination in the perched water zone flows downward into the regional aquifer.

FEASIBILITY STUDY ACTIVITIES

The feasibility study focuses on identifying and evaluating the most appropriate technical approaches for addressing contamination problems that were identified at the site during the remedial investigation. These alternatives are described in detail in the Proposed Plan and the Feasibility Study report.

FOR FURTHER INFORMATION

Interested citizens may review the Remedial investigation and feasibility study report or other site related information at the following information repositories:

Cinnaminson Township Municipal Building
1621 Riverton Road
Cinnaminson Township, NJ 08077
Contact: Catherine E. Obert (609) 829-6000

Cinnaminson Township Community Center
Manor Road
Cinnaminson Township, NJ 08077
Contact: Catherine E. Obert (609) 829-6000

East Riverton Civic Center Association
905 James Street
Cinnaminson Township, NJ 08077
Contact: Dorothy A. Waxwood (609) 829-1258

FOR FURTHER INFORMATION YOU MAY ALSO CONTACT:

Mr. Trevor Anderson
Remedial Project Manager
U.S. Environmental
Protection Agency, Room 711
26 Federal Plaza
New York, New York 10278

REMEDIAL INVESTIGATION

In June 1984, the Cinnaminson Site was placed on the National Priority List (NPL) in response to a ground water contamination problem in the vicinity of the Sanitary Landfill, Inc. (SLI) property located in Cinnaminson Township, New Jersey.

There were several potential sources of ground water contamination detected at the Cinnaminson site. Among these sources are two landfills, which are operated by SLI, and a number of surrounding industries in the area. Based on the results from a quarterly ground water monitoring program performed by SLI, the EPA initiated a remedial investigation in 1985. The remedial investigation was performed to determine the nature and extent of contamination and how conditions may affect human health and the environment. A feasibility study followed in 1989 to identify and evaluate the most appropriate technical approaches for addressing site-related contamination problems.

Field activities were conducted between April 1985 and May 1988 to: determine the source(s) of contamination; obtain a better understanding of the hydrogeology in the area; and identify the types, quantities, and locations of contaminants. Using data gathered from 87 monitoring wells, the remedial investigation identified the presence of volatile organic and inorganic compounds in two separate ground water aquifers. The remedial investigation report was finalized in May 1989. The field activities for the remedial investigation included:

- Field Surveys
- Hydrogeologic Investigation
- Ground Water Sampling and Analysis
- Surface Water Sediment Sampling and Analysis
- Potable Well Sampling

• Field Surveys

A field survey was conducted to prepare a site property map, topographic map, and base map of sampling locations.

• Surface Water Sediment Sampling and Analysis

The objective of this task was to identify contaminants in surface water and sediments. Surface water and sediment samples were collected from retention basins, as well as in Pompeston Creek and Swede Run. Detected in surface water samples were inorganic compounds, which consisted of heavy metals and cyanide. Heavy metals and two pesticides were detected in sediment samples. Several volatile and semi-volatile organic compounds were also found in both sediment and surface water samples.

• Hydrogeologic Investigation

The hydrogeologic investigation was conducted in conjunction with a geophysical investigation to determine the hydrogeologic characteristics of the site and evaluate the extent of ground water contamination. The investigation consisted of: test boring; bore-hole geophysical surveys; drilling and monitoring well installation; permeability testing; and measuring ground water depth on monthly intervals. Accurate elevations of ground water were obtained and ground water flow directions were developed.

Inorganic and organic contaminants were detected in the regional aquifer, which underlies the site, and also in the saturated perched zones, which lie above the regional aquifer. It was determined that the contaminated landfill leachate migrated along the discontinuous clay layers in the unsaturated zone and ultimately into the regional aquifer.

• Potable Well Sampling

Twelve private wells, which were not serviced by the public supply lines, were sampled to determine whether contamination was present. Following the analysis of the sampling, the potable wells were resampled to verify the results. The results showed that twelve metals, nitrate and one volatile organic compound were detected. Nickel was detected in two wells, and nitrate was detected in one well. However, the only contaminants that exceeded ambient water quality standards were nickel and nitrate.

Cinnaminson Ground Water Contamination Site

Burlington County, New Jersey

Region 2

May 1990

INTRODUCTION

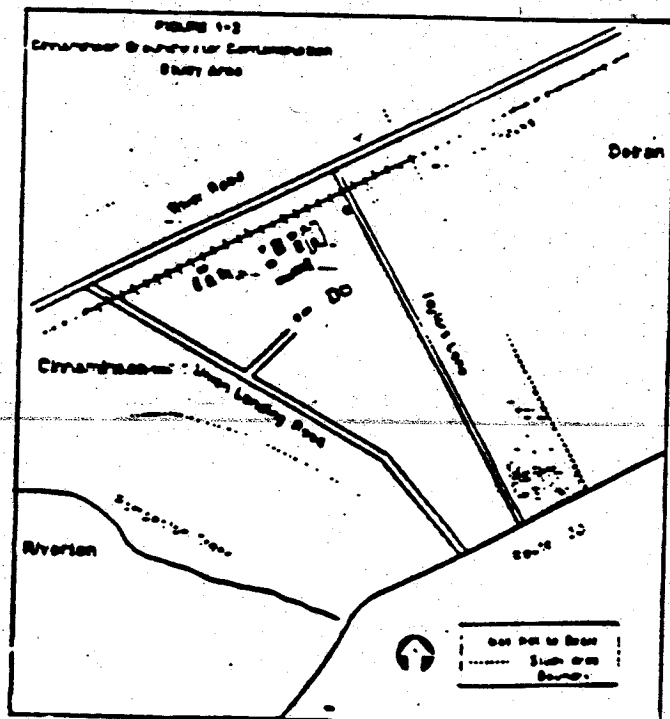
The U.S. Environmental Protection Agency (EPA) is issuing this update to briefly summarize the various remedial investigation and feasibility study activities conducted at the Cinnaminson Ground Water Contamination (Cinnaminson) Site from 1985 to date. For more detail regarding these activities, interested citizens may review the remedial investigation/feasibility study reports at the information repositories established for this site. A list of the repositories is provided on the last page of this update.

SITE BACKGROUND

The Cinnaminson site covers approximately 400 acres in the Townships of Cinnaminson and Delran in Burlington County, New Jersey. It includes properties bounded by Union Landing Road, Route 130, River Road, and Taylors Lane (Exhibit 1). The site consists of residential and light to heavy industrial properties. The Delaware River is located about 5,000 feet northwest of the Site and U.S. Route 130 passes about 2,000 feet to the southeast.

Sand and gravel mining operations were conducted in parts of the site in the 1950s while solid wastes were deposited in previously excavated mining pits on-site. When mining operations discontinued during the late 1960s, larger amounts of refuse and solid wastes were deposited in the mining pits.

Landfilling operations continued until 1981. The landfill was permitted for use as a landfill to dispose of municipal, industrial and institutional wastes, sewage sludge, and food processing wastes. The owner of the landfill, under agreement with the NJDEP, implemented a closure plan for the site in 1981. As part of the closure: a ground water monitoring program was initiated in 1981; and in 1985, the landfills were capped with 18 inches of clay, and a gas collection and venting system was installed. Landfill closure was completed in July 1987.



Appendix E

Superfund Update

**INFORMATION REPOSITORIES
FOR THE CINNAMINSON GROUND WATER CONTAMINATION SITE**

- Cinnaminson Township Municipal Building
1621 Riverton Road
Cinnaminson Township, NJ 08877;
Contact: Grace Campbell, Phone: (609) 829-6000
Hours of operation: Mon. - Fri. 8:30 a.m. to 4:00 p.m.
- East Riverton Civic Center Association
2905 James Street
Cinnaminson Township, NJ 08077
Contact: Dorothy A. Waxwood, Phone: (609) 829-1258
Information available upon request
- Cinnaminson Public Library
1609 Riverton Road
Cinnaminson Township, NJ 08077
Contact: Molly Conners, Phone: (609) 829-9340
Hours of operation:
Mon. - Thurs. 10:00 a.m. to 8:30 p.m.;
Fri. 10:00 a.m. to 5:00 p.m.; and
Sat. 10:00 a.m. to 5:00 p.m. (Except July and August).

Appendix D

Updated Information Repository List

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION II

MEETING WITH CITIZENS, CINNAMINSON TWP., N.J.

WEDNESDAY, JULY 25, 1990
CINNAMINSON TWP. MUNICIPAL BLDG.

PLEASE SIGN IN SO THAT WE CAN ADD YOUR NAME TO OUR PERMANENT
MAILING LIST FOR THE CINNAMINSON GROUNDWATER CONTAMINATION
SUPERFUND SITE

NAME

ADDRESS

John M. Carr *1603 Taylor Ln - Len*

- The Preferred Remedial Alternative does not meet the primary remedial objective, to protect public health and the environment. Ground-water modeling and a review of available data indicate that implementation of the Preferred Remedial Alternative would actually increase the threat of human health effects and environmental damage.
- The Preferred Remedial Alternative does not comply with the statutory requirements for remedial alternatives listed in CERCLA 121(b)(1)(4). The primary areas where the Preferred Remedial Alternative is out of compliance with the statutory requirements of CERCLA are summarized below:
 - Implementation of the Preferred Remedial Alternative will not result in a significant reduction of contaminant concentrations in either the shallow perched zones or the PRM Aquifer to acceptable levels during the implementation period (30 years). In fact, water quality following the implementation period will be degraded.
 - There are other significant areas of ground-water contamination than the landfills contributing to ground-water contamination in the Cinnaminson Study Area. The Preferred Remedial Alternative does not address either the source areas or the primary pathways of migration. Instead, the Preferred Remedy focuses on so-called "hot spots" identified by the USEPA RI.
 - Implementation of the Preferred Remedial Alternative will result in an increase in mobility of contamination from other sources. The increase in mobility will be caused by spreading the more highly contaminated ground water from the source

areas to previously uncontaminated or less contaminated areas of the aquifer.

- The screening, evaluation, and selection of the Preferred Remedial Alternative was based on an inaccurate understanding of site conditions, geology, and hydrogeology. This lead to an inappropriate evaluation of remedial technologies and selection of a remedial alternative which does not fit site conditions. Ground-water quality will degrade over time if the Preferred Remedial Alternative is implemented on the Cinnaminson Study Area.
- The Preferred Remedial Alternative consists of remedial technologies, which are inappropriate for the study area. Other technologies, which would be effective were not considered or were eliminated during the screening process, as summarized below:
 - The treatment system selected for the organics recovered from ground water (biological granular activated carbon) is not appropriate for the organics in the study area.
 - It would be impractical and extremely inefficient to deploy the recovery wells as described in the USEPA FS.
 - The Preferred Remedial Alternative does not consider the beneficial impacts of the existing vapor extraction systems on long-term water quality.
 - The Preferred Remedial Alternative does not consider the beneficial impacts of biodegradation on long-term water quality.
- The Preferred Remedial Alternative is an inefficient use of available resources.

- The present worth of the Preferred Remedial Alternative is extremely high (\$20,475,000) relative to the predicted benefit.
- The Preferred Remedial Alternative does not address contamination from the SLI northwest landfill. This is due to the improper assumption that site conditions at the northwest and southeast landfills are similar.
- The Preferred Remedial Alternative will likely fail due to:
 - Increases in concentrations of organic constituents in the monitoring wells over time. These increases in contamination may result from migration of highly contaminated ground water from other sources towards the recovery systems, or because of the inefficiency of the proposed recovery systems relative to leakage from the landfills.
 - The remedial technology selected from treatment of organics (biological granular activated carbon) is inappropriate for some of the primary organics in the contaminated ground water.
 - The ground-water recovery system captures only a very small percentage (less than 2%) of the overall leakage from the landfill.
- The Preferred Remedial Alternative is incapable of achieving the remedial objectives for the Cinnaminson Study Area.
- Other sources of ground-water contamination have a significant effect on the threat to public health and the environment and will have a detrimental effect on the Preferred Remedial Alternative.

- The volume of discharge from the other sources may be relatively small compared to the discharge from the two SLI landfills. However, the mobility and toxicity of the ground-water contamination from the other sources is much higher, resulting in a major impact on the threat to public health and the environment.
- The Preferred Remedial Alternative does not take the other sources into consideration. Since the recovery wells are located outside the source areas, highly contaminated ground water would be drawn from the other sources and spread into previously uncontaminated or less contaminated parts of the PRM Aquifer and the shallow perched zones. This condition would likely be perceived as a failure of the Preferred Remedial Alternative.

7.2 Recommendations

Based on the review of the USEPA FS, the Plan, and the supporting documents and studies, it is apparent that the Preferred Remedial Alternative proposed by the USEPA is inappropriate for the Cinnaminson Study Area. Ground-water modeling indicates that implementation of the Preferred Remedial Alternative would actually increase the threat to the public health and the environment. An Alternative Remedy is needed which is consistent with site conditions, geology, and hydrogeology, complies with the remedial action objectives, and satisfies the CERCLA statutory requirements. In order to select an Alternative Remedy which satisfies the above requirements, the following work must be performed.

- Supplemental RI. The Supplemental RI would provide the data needed to refine the remedial alternatives for the SLI Southeast Landfill, and select the remedial alternatives for the SLI

Northwest Landfill and the other sources. The supplemental RI would include the following tasks:

- *Task 1 - Field Investigation:* Installation and logging of 12 soil borings; installation, development, and sampling of 11 new monitoring wells, and area-wide measurement of water levels;
- *Task 2 - Water Quality Sampling and Analysis:*
 - sampling of 11 new wells and 40 existing monitoring wells, 9 SII monitoring wells, and 5 gas extraction wells, and
 - analysis of ground-water samples for TCL + 30 and conventionals; and
- *Task 3 - Supplemental RI Report:*
 - **Ground-Water Modeling.** Ground-water modeling would be performed to evaluate the impact of the existing vapor extraction system, and biodegradation on long-term water quality. Recovery well locations and depths would be evaluated in the shallow perched zones and the PRM Aquifer. Well locations would be selected to maximize recovery of contaminated ground water and to minimize the potential of spreading contaminated ground water to previously unaffected areas of the aquifer. The impacts of the other sources on the Alternative Remedy would be assessed.
 - **Risk Assessment.** The risk assessment would consist of the following five elements:
 - data evaluation;
 - toxicity assessment;

- exposure assessment;
- risk characterization, and
- ecological assessment.

The risk assessment would be used in combination with ground-water modeling and a focused FS to evaluate the impact of candidate technologies, and to assure that the Alternative Remedy reduces the threat to public health and the environment to an acceptable level.

- Focused FS. A focused FS is required to refine the Alternative Remedy proposed for the SLI Southeast Landfill and to select appropriate remedial technologies for the SLI Northwest Landfill and the other sources. The Alternative Remedy, which would be evaluated in the focused FS, would consist of the following:

- SLI Southeast Landfill

- low-permeability cover system,
- vapor extraction system,
- shallow ground-water recovery well (number, location, and depths to be selected based on ground-water modeling),
- treatment system to be evaluated,
- injection or discharge system (to be evaluated).

- SLI Northwest Landfill

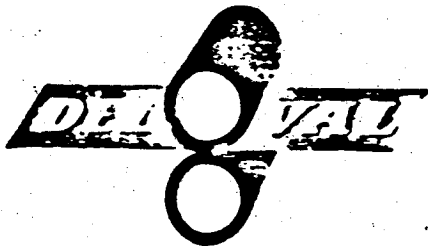
- low-permeability cover soil,
- vapor extraction system,
- recovery and treatment systems (the need for a recovery and treatment system will be evaluated after the mass loading has been determined from ground-water modeling).

- Other Sources

- shallow recovery wells, and
- deep recovery wells (the number, locations, and depth of monitoring wells will be evaluated using ground-water modeling, following the completion of the Supplemental RI).

The Focused FS would provide a detailed evaluation of the Alternative Remedy relative to the remedial objectives and the CERCLA statutory requirements. Risks associated with the Alternative Remedy would be compared to existing conditions and the Preferred Remedial Alternative. A Focused FS Report would be prepared with summarizes the results of the ground-water modeling, risk assessment, and Focused FS. A conceptual design and detailed cost estimate for the Alternative Remedy would be presented in the Focused FS.

- Final Design. Design drawings and construction specifications would be prepared for the Alternative Remedy.



INK AND COLOR
INCORPORATED

FLEXOGRAPHIC AND ROTOGRAVURE INKS

June 1, 1990

1301 TAYLOR'S LANE
RIVERTON, NJ 08077
Phone (Area Code 609) 829-7474
Penns. (Area Code 215) 671-1500

Mr. Trevor Anderson
Remedial Project Manager
United States EPA
Room 711
26 Federal Plaza
New York, New York 10278

Gentlemen:

We are pleased to transmit copies of Science Management Corporation's review of the Camp, Dresser & McKee FRI Report for Cinnaminson Ground Water, EPA #88-01-6939, and the referenced Geraghty & Miller Report contained therein.

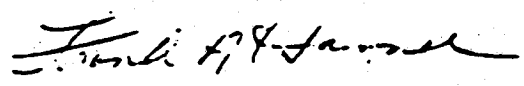
Our consultant's conclusions are as follows:

1. "It can be concluded that there is no evidence presented which confirms the conjectures stated several times that Del Val is a source of contamination" (Section 5, Page 11)
2. "This consultant concludes that CDM statement is misleading when it refers to Del Val as a possible minor source of contamination since they have not first established the presence of an additional source of contamination downgradient of wells found to contain contamination" (Section 7, Page 10)

~~Copies of the consultant's report are enclosed for your use.~~
Based on this independent consultant's report, Del Val is not a contamination of the soil and not a party to the CERCLA clean-up process.

Del Val, however, urgently supports the clean-up efforts since its property value has been drastically reduced by SII's actions.

Very truly yours,
DEL VAL INK & COLOR INC.


Frank A. Hamel, Jr.
President

FAH:rf
Encs.

cc: Mr. Dick Winer, SMC

SMC Environmental Services Group

A Subsidiary of Science Management Corporation

900 W Valley Forge Road

PO Box 859

Valley Forge Pennsylvania 19482

Telephone 215 265-2700

May 8, 1990

Ref: 9524-89000

Mr. Frank A. Hamel, Jr.
Del Val Ink and Color, Inc.
1301 Taylors Lane
Riverton, NJ 08077

Subject: Review of Geraghty & Miller's Annual Reports

Dear Mr. Hamel:

Included with this letter is one copy of our review of Geraghty & Miller's 1983 and 1985 annual reports, which were used as references by the 1989 Camp, Dresser & McKee (CDM) report. This review is intended to be used as an addendum to SMC's rebuttal to the CDM report, dated November 1989, which you already possess.

The objective of our review documented in this letter is to determine if CDM correctly interpreted information in the Geraghty & Miller annual reports for use in their 1989 C. Hamilton Landfill Study. We have determined that there are alternative interpretations of the data that differ from CDM's.

We will be pleased to discuss the content of this section should any questions arise.

Sincerely,

SMC ENVIRONMENTAL SERVICES GROUP

Peter D. Beyer

Peter D. Beyer
Project Geologist

Richard M. Winar

Richard M. Winar, CPG
Vice President
GeoEnvironmental Sciences Group

PDB:rm

Enclosures

9524:PBCL1J.WP

(DRAFT)

**REBUTTAL TO CINNAMINSON
GROUND WATER CONTAMINATION STUDY
FINAL REMEDIATION REPORT**

Prepared for:

**Mr. Frank A. Hamel, Jr., President
Del Val Ink & Color Inc.
1301 Taylors Lane**

Prepared by:

**SMC Environmental Services Group
900 W. Valley Forge Road
P. O. Box 859
Valley Forge, PA 19482**

November 1989

Ref: 9524-89000

9524:ERQVPJ.WP

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 HYDROGEOLOGICAL REVIEW	2
3.0 GROUND WATER CONTAMINATION	3
4.0 AIR CONTAMINATION	10
5.0 CONCLUSION	11
6.0 RECOMMENDATIONS	12

1.0 INTRODUCTION

This report describes a critique prepared by SMC Environmental Services Group (SMC) for Del Val Ink and Color Inc. (Del Val). The critique is of a 1989 report prepared by Camp, Dresser & McKee Inc. for the U.S. Environmental Protection Agency entitled "Final Remediation Investigation Report for the Cinnaminson Ground Water Contamination Study" (The Report). One purpose of this critique is to identify and address any statements made in The Report which are unfounded, otherwise incorrect, and/or unjustly detrimental to Del Val. The specific objective of this report is to evaluate and discuss, if appropriate, all negative statements made in The Report concerning Del Val.

2.0 HYDROGEOLOGICAL REVIEW

Based on our review of The Report, we generally concur with its description of the hydrogeologic system of the study area. Conclusions a-e in The Report (page 1-3) adequately summarize the study area hydrogeology. It is important to point out that although the regional ground water flows in a southeastern direction (Figure 4-8 in The Report), the mounding of the shallow ground water under the landfills and the clay liners in the "upper zone" of the Potomac-Raritan-Magothy (PRM) formation have caused the shallow ground water to (locally) flow radially away from the landfill in all directions but at varying distances and velocities. However, the shallow ground water (upper zone) will eventually flow southeast and mix with the moderate and deep ground water (lower zone). Shallow ground water flowing in directions other than southeast as a result of the mound will eventually reach the boundary of the zone of influence of the ground water mound and will then change direction and flow southeastward. Shallow ground water migrating on top of the clay lenses will eventually reach a break or discontinuity in the clay lens, migrate vertically down, mix with the lower zone, and change direction to move southeast.

3.0 GROUND WATER CONTAMINATION

Conclusion m in The Report (page 1-5) states that, "It appears that Del-Val Ink is also a source of ground water contamination found in the Cinnaminson Study Area. However, based on the number of compounds and their concentrations and the number of wells found contaminated, it appears that Del Val Ink & Color is only a minor source of ground water contamination found in the Cinnaminson Study Area." The basis for this conclusion is not stated. However, based on the data presented in The Report, it may be surmised that this conclusion was reached after analyzing the results of two rounds of sampling from wells EPA-A6S and EPA-A6M. These samples, from wells located on Del Val property, were collected in December 1986 and July 1989. Results of these sampling rounds are given on Tables 9-16 and 9-21 in The Report.

Various constituents and their concentrations in the ground water samples collected from GW-A6S and GW-A6M in December 1986 and July 1987 are given on Table 1. The organic chemicals detected were chloroethane; acetone; 1,1-dichloroethane; trans-1,2-dichloroethene; 1,2-dichloroethane; benzene; toluene; chlorobenzene; ethylbenzene; total xylene; dichlorofluoromethane; 1,2-diethoxyethane; and di-isopropyl ether. There is data given within The Report that suggests that all of these constituents can be attributed to sources other than Del Val. The following statements summarize this supporting data.

TABLE 1

DEL VAL INK & COLOR INC.
Ground Water Analytical Results
Summary of Organics Detected

Compound	Concentrations (ppb)			
	December - 1986		July - 1987	
	GW-A6S	GW-A6M	GW-A6S	GW-A6M
Chloroethane	17	9 J	39	16
Acetone	6 JBR	20 BR	29	ND
1,1-dichloroethane	ND	28	3 J	59
Trans-1,2-dichloroethene	ND	2 J	ND	2 J
1,2-dichloroethane	ND	10	ND	17
Benzene	5	31	12	50
Toluene	1 J	1 J	ND	ND
Chlorobenzene	6	7	11	13
Ethylbenzene	8	10	29	53
Total Xylene	14	7	27	5
Dichlorofluoromethane	ND	8.1 J	ND	ND
1,2-diethoxyethane	ND	22 J	ND	ND
Di-isopropyl ether	ND	5.6 J	ND	ND

Notes:

- ND - Compound analyzed for but not detected.
 J - Estimated value. Reported value is less than the contract required detection limit but greater than zero.
 R - Rejected. Compound did not meet QA/QC requirements.
 B - Compound found in QC blank.

This Table was derived from data presented in The Report.

9524:ERTBLJ

1. Acetone. - This compound is commonly detected in environmental samples because of laboratory or field contamination. This statement is supported on page 9-33 in The Report - "Two of the sixteen compounds (methylene chloride and acetone) were also detected in the field and trip blanks. Therefore, the presence of these two compounds might be due to laboratory or field contamination."
2. Benzene, toluene, chlorobenzene, ethylbenzene, and trans-1,2-dichloroethene. - These compounds were detected at comparable or higher concentrations in well samples taken from beneath the landfill. Since the landfill is located upgradient hydrogeologically from Del Val, these compounds probably originated from the landfill. This statement is supported on page 9-33 in The Report - "Seven of the sixteen volatile organic compounds (vinyl chloride, methylene chloride, trans 1,2-dichloroethene, benzene, toluene, chlorobenzene, and ethylbenzene) were also detected in the landfill gas vent samples at comparable or higher concentrations."
3. Total xylene. - Total xylene was also found at higher concentrations in well samples taken from beneath the landfill (Table 9-2 in The Report). The average reported total xylene concentration in wells GW-A6S and

GW-A6M is 13.25 ppb. The average reported concentration of total xylene in the samples from the wells beneath the landfill is 394 ppb, with a qualifier that total xylene was found in a QC blank. Further, The Report does not suggest that Del Val is the source of total xylene.

4. 1,1-dichloroethane and 1,2-dichloroethane. - These compounds have been detected in comparable or higher concentrations in upgradient wells in both the upper and lower zones of the PRM. Several examples of upgradient ground water samples in which 1,1-dichloroethane was detected include Well C6S in July 1987 with 440 ppb, Well C4M in July 1987 with 120 ppb, and Well C6M in July 1987 with 38 ppb. Examples of upgradient ground water samples in which 1,2-dichloroethane was detected include Well A1M in December 1986 with 46 ppb, Well C6S in July 1987 with 230 ppb, and Well C6M in July 1987 with 84 ppb. Average concentrations of 1,1-dichloroethane and 1,2-dichloroethane in samples obtained from the wells on Del Val property are 23.8 ppb and 9.3 ppb, respectively. Since these compounds have been detected at higher concentrations in upgradient wells, it is conceivable that the source of these contaminants is

located upgradient to the north or northwest of the Del Val property.

5. Dichlorofluoromethane, 1,2-diethoxyethane, and diisopropyl ether. - These compounds were only detected once, i.e., in Well GW-A6M in December 1986, and were reported only at estimated concentrations. None of these compounds were detected in the wells on Del Val property in July 1987. Thus, these compounds should not be of concern to Del Val. This statement is supported in page 9-60 of The Report - "Some of the organic compounds (dichlorofluoromethane, diisopropylether) detected during the earlier Phase 1A monitoring well sampling, which indicated that Del Val Ink and Color could be a possible source of contamination, were not detected in samples from wells EPA-A6S and EPA-A6M during this sampling program."
6. Chloroethane. - Excluding the wells on Del Val property, this compound was only detected twice, i.e., Well A1S in December 1986 at 55 ppb and Well C7M in July 1987 at 2J ppb. The qualifier J means that the magnitude of the reported concentration is estimated. Well A1S is located upgradient and Well C7M is located cross gradient from Del Val. The average concentration of chloroethane in the samples from the wells on

Del Val property is 20.3 ppb. However, chloroethane is also documented in The Report (page 2-1) as being detected in a deep monitoring well identified in a report prepared by Geraghty & Miller Inc. Also, Del Val has reported to SMC that they have never used chloroethane. Thus, it is unlikely that Del Val has been a source of chloroethane contamination.

Other items of concern with regard to ground water contamination and Del Val are the following two statements made in The Report. On page 9-36, The Report claims that, "Samples from Wells EPA-A6S and EPA-A6M, located in the vicinity of Del Val, contained organic compounds (chloroethane, 1,1-dichloroethane, 1,2-dichloroethene, benzene, chlorobenzene, and di-isopropyl-ether) that indicate that Del Val operations may be the source of these contaminants." (Inclusion of "1,2-dichloroethene" on this list is probably a spelling error since this compound is not found in samples from Well EPA-A6S and EPA-ABM; but, 1,2-dichloroethane was found in these wells.) However, the presence of these organic compounds in the samples collected from the wells on Del Val property, as discussed above, is more likely due to migration from an upgradient source.

On page 9-60, The Report states that "But, other volatile organic compounds (1-1-dichloroethane, 1,2-dichloroethane, chloroform, trichloroethane, tetrachloroethene) detected during Phase IA sampling as well as in this sampling program in wells

located close to the Del Val Ink Color indicate that these compounds may be contributed by Del Val operations. Therefore, Del Val is considered a probable source of ground water contamination in the area." However, there is no evidence presented in The Report which indicates that the presence of these compounds in the ground water is related to or caused by Del Val operations. The on-site occurrence of 1,1-dichloroethane and 1,2-dichloroethane have already been discussed in this report. Chloroform, trichloroethene, and tetrachloroethene have never been detected in any of the samples obtained from the wells on the Del Val property. Further, these compounds have been detected in samples from upgradient wells. Thus, based on the data presented within The Report, there is evidence which indicates that Del Val is not the source of chloroform, trichloroethene, or tetrachloroethene contamination.

Also with regard to the area's ground water contamination and Del Val, the comments made on conventional parameters (page 9-38) and total volatile organic contaminants (VOCs) (page 9-60) in The Report should be noted. On page 9-38, The Report states that three conventional parameters (TDS, ammonia, and chloride) were detected in Well EPA-A6M at relatively high concentrations, but were probably due to the landfill. On page 9-60, The Report states that the source of the total VOCs present in Well EPA-A6S appear to be the landfill.

4.0 AIR CONTAMINATION

On page 5-13, The Report states that Del Val could be a source of methylene chloride contamination in air. It goes on to say that methylene chloride was detected in air samples from two of five sample stations. The air sample from Station 3, on the Del Val property, detected a methylene chloride concentration of 3.49 mg/l. The air sample from Station 5 had a methylene chloride concentration of 16.03 mg/l. Without knowing the prevailing wind direction, it is difficult to pinpoint the possible source of methylene chloride. However, contaminant transport in air for a continuous source of contamination moves from points of high concentration to points of low concentration. Thus, it is conceivable that Station 5 could be the source of the methylene chloride concentration in the air sample at Station 3.

5.0 CONCLUSION

Based on the information within The Report and our review of this data, it can be concluded that there is no evidence presented which confirms the conjectures stated several times that Del Val is a source of contamination. All of the organic contaminants identified in the ground water samples taken from the wells located on Del Val property can more logically be attributed to sources other than Del Val. The methylene chloride contamination detected in the air sample taken from Station 3, located on Del Val property can possibly be attributed to a source other than Del Val.

6.0 RECOMMENDATIONS

To strengthen Del Val's position, SMC recommends the following:

1. Conduct a Phase I Environmental Assessment as described in Task 3 of the October 19, 1989 proposal.
2. Conduct an inventory of the history of organic chemicals used at Del Val. Based on this inventory, perform a fate and persistence study on the inventoried organic chemicals to identify their potential breakdown components. This will confirm that the organic chemicals of concern discussed in this report are not breakdown products of the chemicals used by Del Val.
3. Conduct a review of the available Geraghty & Miller Inc. reports referenced in The Report.

SECTION 7.0

**REVIEW OF ADDITIONAL DOCUMENTS
ADDENDUM TO
CAMP, DRESSER & MC KEE REBUTTAL**

Prepared for:

**Del Val Ink and Color, Inc.
1301 Taylors Lane
Riverton, NJ 08077**

Prepared by:

**SMC Environmental Services Group
900 W. Valley Forge Road
P. O. Box 859
Valley Forge, PA 19482**

May 1990

Ref: 9524-89000

9524:FBCVPJ.WP

7.0 REVIEW OF ADDITIONAL DOCUMENTS

7.1 Introduction

The 1989 Camp, Dresser & McKee report, which was reviewed for Del Val, identified as major references the Geraghty & Miller 1983, 1984, and 1985 annual reports entitled, "Hydrologic and Ground-Water Quality Conditions at the Landfill Operated by Sanitary Landfill, Inc., Cinnaminson, New Jersey". Because of their use as references, an attempt was made to obtain these reports from the EPA and review them also. After filing a Freedom of Information request letter, and after considerable EPA delays, SMC obtained the 1983 and 1985 annual reports, but not the 1984 annual report.

Close inspection of the 1983 and 1985 reports indicated that, other than the results of the laboratory analysis of each year's ground water samples, there was little difference in content between the two publications. It was also discovered that the 1985 annual report contained the results of the laboratory analysis of the groundwater samples from 1983 and 1984, as well as 1985. Based on these two findings, SMC decided it would be sufficient to simply perform the evaluation of the 1983 and 1985 annual reports and that it would not be necessary to review the 1984 annual report.

7.2 1983 Annual Report

Geraghty & Miller state that there is both a shallow water table aquifer, and a deeper artesian aquifer underlying the landfill.

The ground water in the deep artesian aquifer flows generally southward. The depth to the top of the deep, artesian aquifer ranges from between approximately 30 feet to 50 feet below ground surface.

The shallow water table aquifer was found to consist of localized water zones perched on top of a clay layer. This clay layer was found to be discontinuous along the northern and southern boundaries of the landfill. This lack of continuity of the clay layer indicates that ground water in the water table aquifer probably flows only a short distance radially away from the landfill along the clay layer before it finds a break in the clay and migrates vertically downward to join with the deep, artesian aquifer. Therefore, the ground water in the shallow water table aquifer flows in a direction away from the landfill and towards Del Val. The presence of discontinuities in the clay layer means that any contamination present in the shallow water table aquifer should eventually enter the deep artesian aquifer. The depth to the water table zones depends on what depth at which the clay layer supporting the ground water is found. In general, the depth to the water table aquifers ranges from between 12 feet and 32 feet.

Each well used for sampling the deep artesian aquifer has the letter "D" on the end of its code designation (e.g., GM-8D); whereas those wells used for sampling the shallow water table aquifer do not have the "D" (e.g., GM-8) in their title.

Geraghty & Miller's 1983 annual report also indicates that Del Val's location, in regard to the deep artesian aquifer flow direction, is cross-gradient to most of the landfill. Since ground water flows in a downgradient direction, and south is downgradient for this aquifer, this means that only the southeastern portion of the landfill is considered to be a likely area for recharge from any contaminated ground water that may originate from Del Val. For this reason, wells in the southeastern portion of the landfill were reviewed by SMC to determine if ground water quality in this area was affected by Del Val. A diagram of Del Val and the surrounding area is shown in Figure 1. Ground water flow direction in the shallow water table aquifer is generally perpendicular to the boundaries of the landfill. Ground water flow direction in the deep artesian aquifer flows in the southerly direction the arrows indicate. Also, wells that are important for the characterization of ground water quality near Del Val (GM-1, GM-1D, GM-8, GM-8D, GM-10) are circled and labeled.

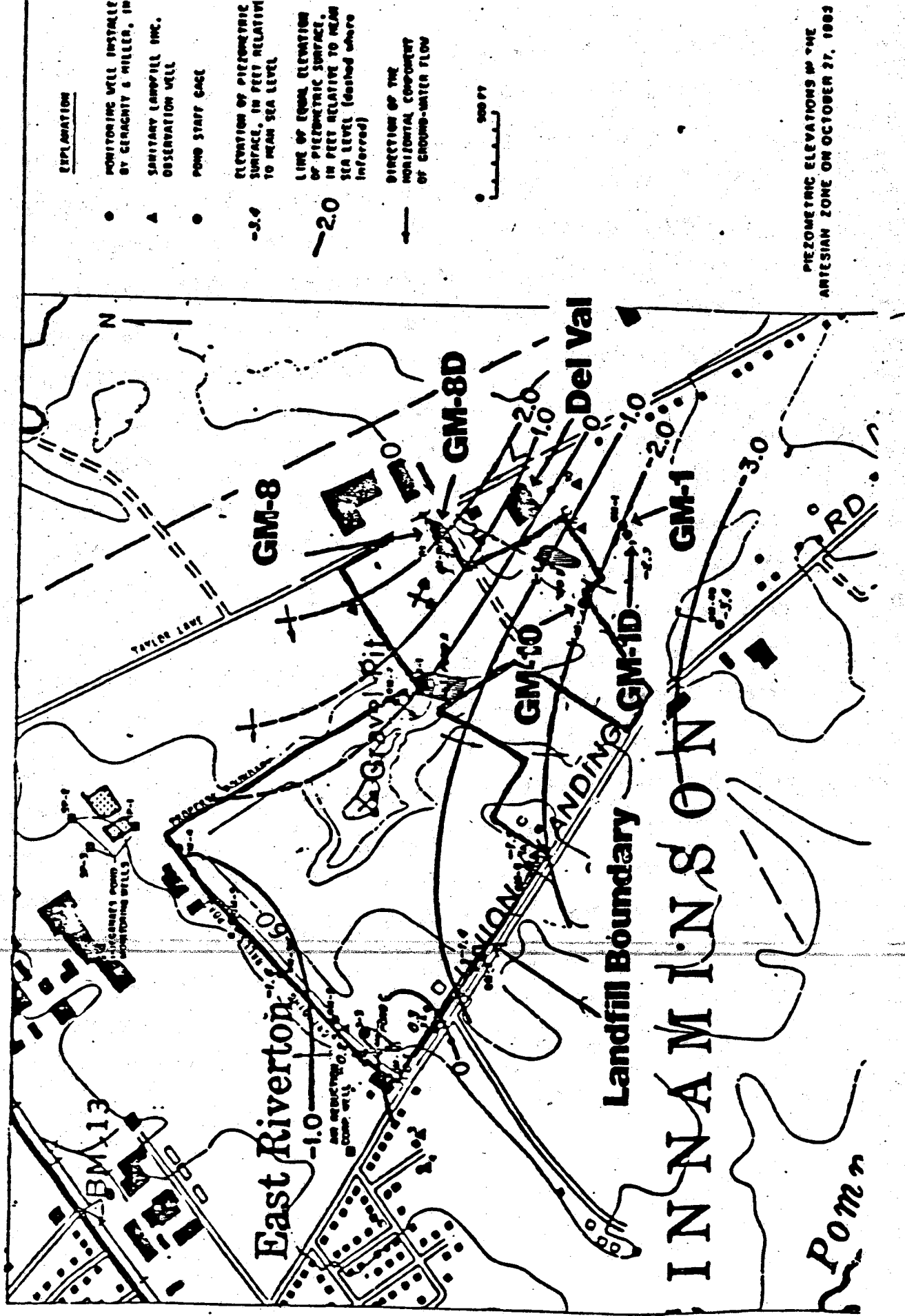
7.2.1 1983 Deep Artesian Aquifer Sampling Results

The report of Geraghty & Miller's 1983 ground water sampling program indicates that contamination was being

Figure 1

1983 Deep Aquifer Groundwater Flow Direction

(From Geraghty & Miller, 1983)



PIEZOMETRIC ELEVATIONS IN THE ARTESIAN ZONE ON OCTOBER 27, 1983

introduced into the deep, artesian aquifer from a source north and upgradient of Del Val. Monitoring well GM-8D, the deep aquifer well located on the northern border of the landfill approximately 500 feet north and up-gradient from Del Val, was reported to contain benzene (252 parts per billion), chlorobenzene (28 ppb), chloroethane (33 ppb), chloroform (62 ppb), 1,1-dichloroethane (485 ppb), 1,2-dichloroethane (141 ppb), ethylbenzene (1,150 ppb), and toluene (2,930 ppb). By contrast, monitoring well GM-1D, the deep aquifer well which is directly downgradient of the Del Val property, contained a much lower level of contamination: benzene (12 ppb), chlorobenzene (32 ppb), chloroethane (31 ppb), and ethylbenzene (12 ppb). As can be seen, monitoring well GM-1D did not contain any compounds that were not found in monitoring well GM-8D. However, many compounds not found in GM-1D were present in GM-8D. If Del Val were a source of contamination, new contaminants and higher concentrations of contaminants would be expected in GM-8D. The fact that this condition does not exist suggests that the main source of ground water contamination for the deep, artesian aquifer originates from a source upgradient of Del Val, and/or even possibly upgradient from monitoring well GM-8D.

7.2.2 1983 Shallow, Water Table Aquifer Results

The water table aquifer monitoring well upgradient of Del Val (GM-8) was not sampled in 1983, and therefore there was

no characterization of ground water quality of the shallow water table aquifer up-gradient of Del Val in 1983.

Moreover, well GM-10, a shallow water table aquifer monitoring well downgradient from Del Val, contained no detectable levels of any volatile organic compounds. Since Del Val is a user of several volatile organic compounds, the absence of these compounds indicates that Del Val was not releasing any of these compounds into the ground water.

7.3 1984 Data in the 1985 Annual Report

As stated previously, SMC did not obtain a copy of Geraghty & Miller's annual report for 1984. However, SMC did obtain Geraghty & Miller's 1985 annual report which contained the laboratory results from the 1984 sampling program and a short text explaining these results.

During Geraghty & Miller's 1984 sampling program the water levels in both the artesian and water table aquifers were reported to have dropped to such low levels that several of the monitoring wells on the landfill could not be sampled because they were dry. Geraghty & Miller did sample two wells down-gradient of the Del Val property (wells GM-10 and GM-1D), but only one of the wells upgradient from Del Val (well GM-8).

Because the downgradient, deep aquifer, monitoring well (GM-8D) was dry, no sample could be obtained from it. This means that there was no analysis of the ground water from the artesian aquifer upgradient from Del Val in the 1984 sampling program, and

therefore no quantification of the amount of contamination entering the artesian aquifer from upgradient could be made in 1984. Figure 2 shows the south-southeasterly ground water flow direction (arrows) of the deep artesian aquifer and the location of each of the above mentioned monitoring wells.

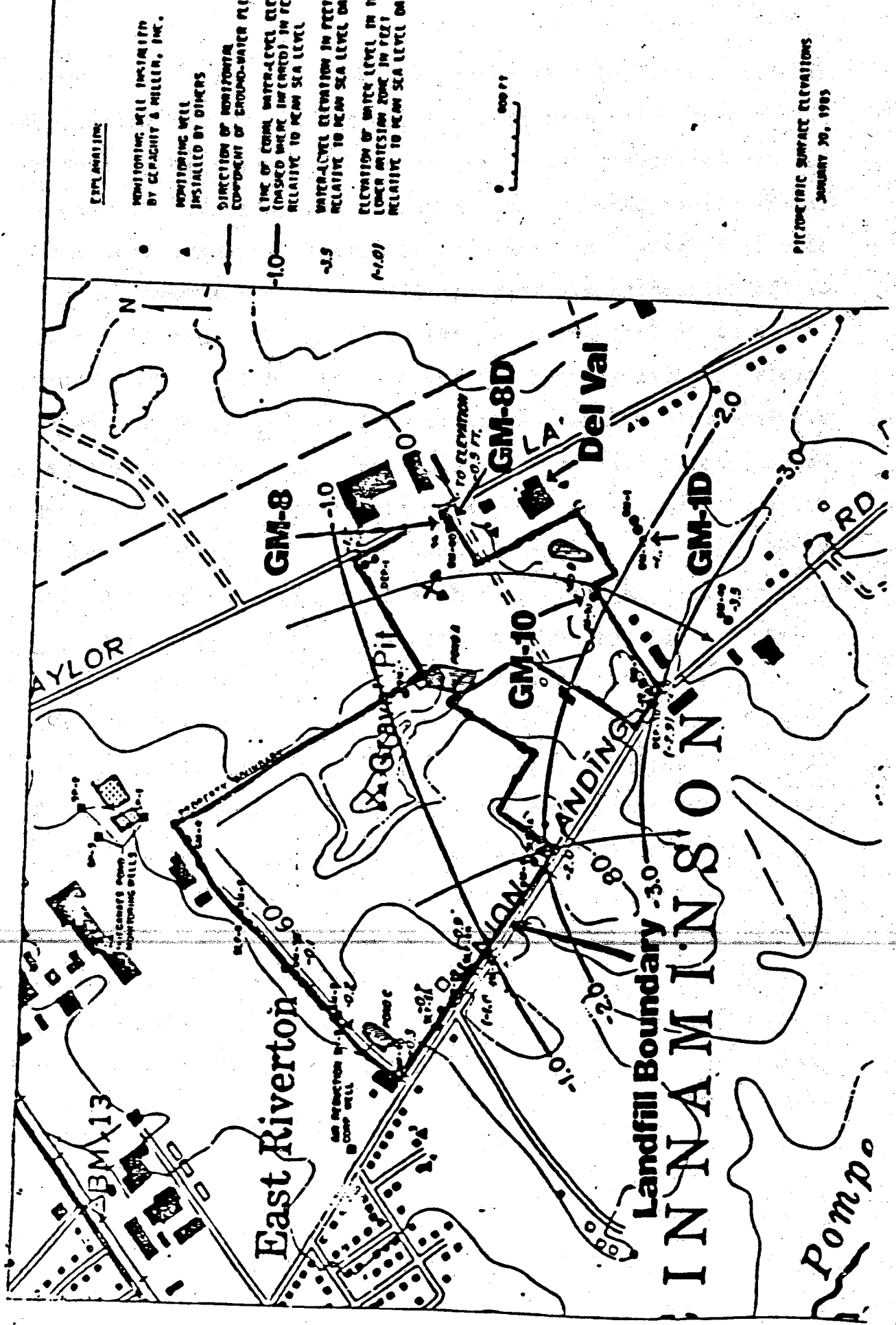
7.3.1 1984 Shallow Water Table Aquifer Sampling Results

The results of the 1984 shallow water table aquifer sampling program listed in the 1985 annual report indicated high levels of contamination were still entering the landfill north and upgradient of Del Val. The 1984 data states that GM-8, the shallow water table aquifer monitoring well upgradient from Del Val, "showed high (a total of 884 parts per billion) concentrations of VOCs, primarily non-halogenated compounds (benzene, toluene, xylene). The upgradient location of this water table zone monitoring well with respect to the landfill indicates the existence of upgradient off-site source(s) of contamination." The complete list of compounds found in monitoring well GM-8 includes benzene (192 ppb), chlorobenzene (30 ppb), 1,1 dichloroethane (11 ppb), 1,2 dichloroethane (17 ppb), ethylbenzene (575 ppb), and toluene (11 ppb). By comparison, GM-10, which is the water table aquifer monitoring well downgradient of Del Val, did not report any of the above parameters but did contain 13 ppb of chloroethane. The fact that chloroethane was present in the downgradient well GM-10 but not in the upgradient well GM-8 might suggest that Del Val could have

Figure 2

1984 Deep Aquifer Groundwater Flow Direction

(From Geraghty & Miller, 1984)



been the source of this compound. However, after a comprehensive research of their past chemical purchases and inventories, Del Val can positively state that they have never used chloroethane in the plant (personal communication, A. Tobias). However, it is also conceivable that the landfill itself may have been a source of the chloroethane. In general however, these results show high levels of contamination upgradient of Del Val, but only low levels of contamination downgradient of Del Val. This again suggests that Del Val was either only a very minor source of contamination for the water table aquifer, or that there is a discontinuity of the clay layer between Del Val and GM-10 which would allow for downward migration of contaminated ground water into the artesian aquifer before it can be sampled at GM-10.

7.3.2 1984 Deep Artesian Aquifer Sampling Results

The results of the analyses of the ground water in the deep artesian aquifer show that GM-1D, the artesian aquifer monitoring well downgradient from Del Val, contained benzene (14 ppb), chlorobenzene (37 ppb), chloroethane (40 ppb), 1,1 dichloroethane (15 ppb), ethylbenzene (26 ppb), and toluene (21 ppb). Because GM-8D, the upgradient, artesian zone monitoring well, was dry, the concentration of contamination present in the artesian aquifer upgradient of Del Val could not be determined. Thus, for 1984, the origin of the ground water contamination in the artesian aquifer cannot be determined with certainty.

7.4 1985 Annual Report

Geraghty & Miller's 1985 sampling program was changed significantly from the previous years programs. All five monitoring wells that defined groundwater quality upgradient and downgradient of Del Val in 1983 and 1984 (GM-1D, GM-1, GM-10, GM-8, and GM-8D) were either found to be dry or were not sampled in 1985.

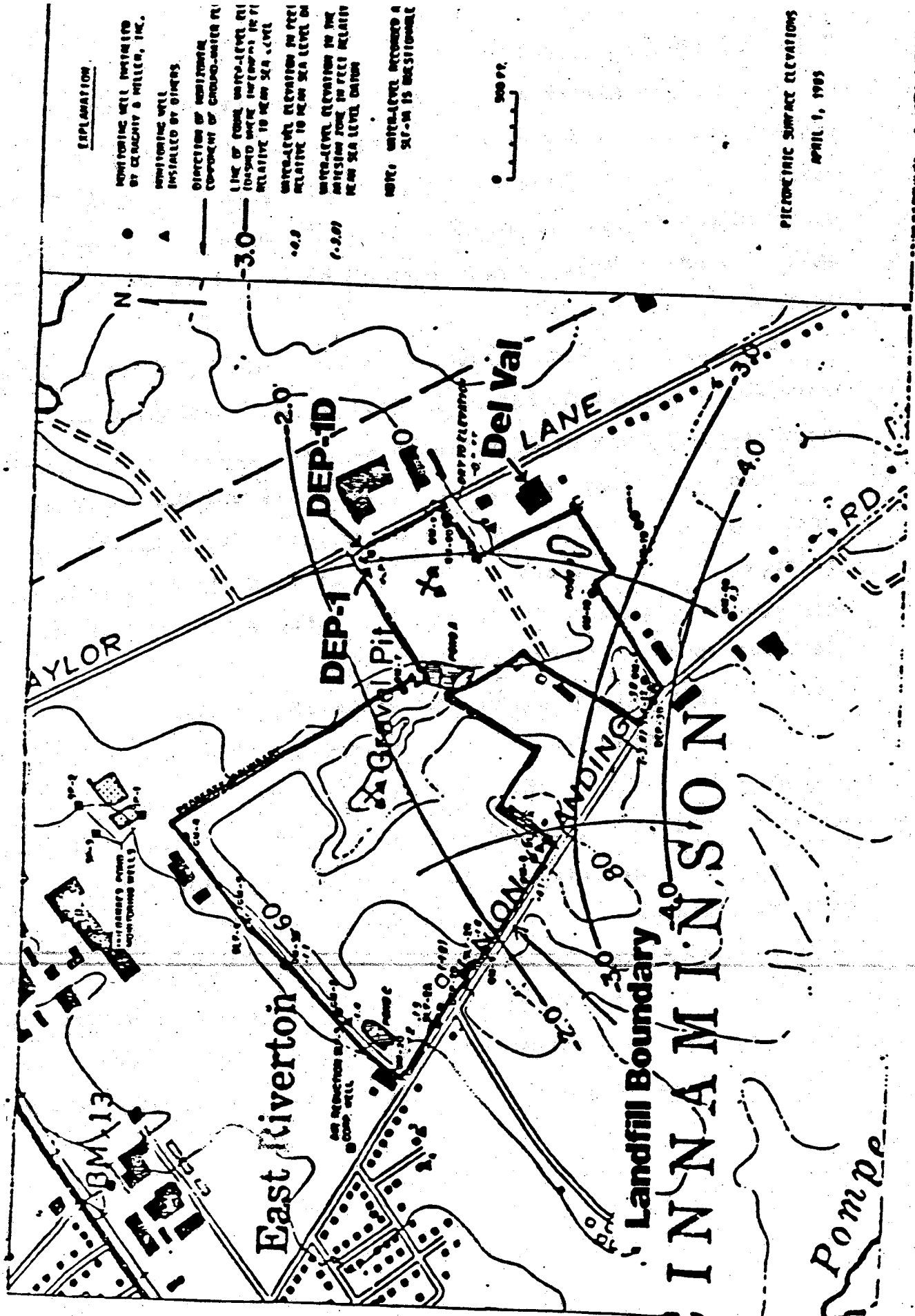
However, two wells installed in early 1985 yielded evidence which again indicated that contamination was continuing to be introduced into the deep, artesian aquifer upgradient of Del Val. These two monitoring wells, designated DEP-1 and DEP-1D, are located about 1,000 feet north and upgradient from the Del Val property. Figure 3 shows the south-southeasterly direction of deep aquifer ground water flow as indicated by the arrows, and the location of wells DEP-1 and DEP-1D.

7.4.1 1985 Deep Artesian Aquifer Sampling Results

The 1985 results showed that DEP-1D, the upgradient, deep artesian aquifer monitoring well contained benzene (327 ppb), chlorobenzene (405 ppb), 1,1 dichloroethane (208 ppb), 1,2 dichloroethane (186 ppb) and methylene chloride (88 ppb). Although there were no wells downgradient of Del Val that were sampled, the 1985 annual report states that, in general, for the whole landfill area, "volatile organic compound concentrations in downgradient wells are one to two orders of magnitude lower than in upgradient wells for the same species of organic compounds and

1985 Deep Aquifer Groundwater Flow Direction

(From Geraghty & Miller, 1985)



EXPLANATION

- MONITORING WELL INSTALLED BY GERAGHTY & MILLER, INC.
- MONITORING WELL INSTALLED BY OTHERS
- DIRECTION OF MONITORING COMPONENT OF GROUND-WATER FLOW
- LINE OF FLOOD WATER-LEVEL RELATIONS (WATER-LEVEL RELATIONS) IN FEET RELATIVE TO MEAN SEA LEVEL
- WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- NOTE: WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL



PIEDMONT SURFACE ELEVATIONS
APRIL 1, 1985

are probably all from the same source." This statement is based on conclusions made on data collected in the western portion of the landfill. Although it cannot be proven, Geraghty & Miller suggests that this condition exists for the landfill area as a whole.

7.4.2 1985 Shallow Water Table Aquifer Sampling Results

As stated previously, the only water table aquifer well in close proximity to Del Val that was sampled in 1985 was the upgradient monitoring well DEP-1. DEP-1 was found to contain benzene (623 ppb), chlorobenzene (1,290 ppb), ethylbenzene (1,360 ppb), methylene chloride (4.8 ppb), and 1,2 Trans-dichloroethene (60.5 ppb). These results again show that there were detectable levels of VOC contamination in the area north and upgradient of Del Val. Because no wells downgradient of Del Val were sampled at this time, this sampling program cannot be used to determine if either Del Val or the landfill was adding to the contamination of the aquifer.

7.5 Conclusion

The data from all three sampling programs indicates that, for the years 1983 through 1985, there was contamination present in wells upgradient from Del Val. However, it is important to note that Camp, Dresser, & McKee's (CDM) conclusions in their 1989 report were drawn from data collected in 1986 through 1989, while the period covered by Geraghty & Miller's annual reports was 1983 through 1985. Additionally, (CDM) was able to draw upon

data from wells that were installed after the time period covered by Geraghty & Miller's annual reports. However, this consultant concludes that CDM's statement is misleading when it refers to Del Val as a possible minor source of contamination, since they have not first established the presence of an additional source of contamination downgradient of the wells found to contain contamination. There are three reasons for this.

The first reason concerns the shallow, water table aquifer. CDM states that water in this zone flows in the direction that the clay layer upon which it is perched dips, which could be in many directions. Geraghty & Miller states that the major component of ground water movement in the shallow water table aquifer is vertically downward with little lateral movement off-site. Both of these statements indicate that ground water in the water table zone moves in a random direction and thus the source of any ground water contamination cannot be determined with certainty.

The second reason concerns the 1984 and 1985 ground water sampling program for the deep artesian aquifer. In 1984, no artesian aquifer monitoring well upgradient from Del Val was sampled. In 1985, no artesian aquifer monitoring well down-gradient of Del Val was sampled. These two facts mean that a concentration gradient for 1984 and 1985 could not be established, and thus, for 1984 and 1985, no source of

contamination in the deep artesian aquifer can be determined with certainty.

The third reason deals with the 1983 results of ground water analyses for the deep, artesian aquifer. As stated previously in this section, the upgradient well GM-8D recorded much higher levels of contamination than well GM-1D, the deep aquifer monitoring well downgradient of Del Val. This clearly states that there is contamination entering the deep aquifer upgradient of Del Val. However, the question of whether or not Del Val contributed to this contamination as it moved under Del Val can still not be answered because no rate of attenuation (dissipation) could be calculated for the contamination reduction between the upgradient and downgradient wells. If given enough information, we can calculate a rate of attenuation over short distances; however, we have insufficient data and cannot determine if new sources have been added between the two points where the contamination level is known.

**RESPONSE TO
DEL VAL INK & COLOR COMMENTS
ON THE CINNAMINSON REMEDIAL
INVESTIGATION REPORT**

**prepared by
The U.S. Environmental Protection Agency**

July 31, 1990

ATTACHMENT

Section 2.0, page 2, addresses ground water "mounding" and perched water conditions at the site. SMC Environmental Services Group (SMC) notes that shallow ground water flow is "(locally) radially away from the landfill in all directions but at varying distances and velocities" due to ground water mounding and clay "liners" of the Potomac-Raritan-Magothy (PRM) formation.

Camp Dresser & McKee Inc. (CDM) is no longer using the term "mounding" to describe the conditions at the SLI landfill. There is no evidence of mounding of the semi-artesian aquifer. As stated in "Response to PRP comments, Cinnaminson Study Area, Cinnaminson, New Jersey (CDM FPC, June 1990, page 7) perched water exists beneath and surrounding the landfill due to natural clay layers and/or impermeable zones within the fill material itself. However, no conclusions regarding the distance perched ground water flows away from the landfill or the velocity of such flow were presented in the RI report.

The flow of perched water is independent of the ground water flow in the semi-artesian zone, however radial flow in all directions outward from the landfill is not believed to occur. Perched water flow is more likely controlled by the dip of the clay layers. (CDM FPC, June 1990, pages 7-9).

SMC uses the term clay "liners" in reference to the upper zone. Only natural clay layers exist. These are known to be naturally discontinuous (see RI fence diagram and CDM FPC, June 1990, page 5) and may have been removed by excavation in certain areas of the landfill. Thus, they are not believed to be very effective as liners. However, SMC is correct in their statement that perched ground water which eventually reaches a break or discontinuity in a clay lens will migrate vertically downward, mix with water in the lower (semi-artesian) zone and flow southeast with regional ground water flow.

Section 3.0 of the SMC report refers to statements in the RI report indicating that Del Val Ink & Color, Inc. (Del Val) is a source of ground water contamination. Six subsections of Section 3.0 are concerned with various chemical contaminants. Subsection 1 (page 5) states that acetone in ground water samples could be due to laboratory or field contamination.

Data validation criteria for common lab contaminants were adhered to (see CDM FPC, June 1990 page 12). The acetone found in both the shallow and deep well from the December 1986 sampling was rejected. However, the acetone concentration found in GW-A65 in the July 1987 samples was not rejected and is believed to represent actual conditions. Therefore, Del Val is a possible source of acetone contamination.

Subsections 2 through 5 (pages 5 through 7) address the possibility of Del Val being a source of the following ground water contaminants: benzene, toluene, chlorobenzene, ethylbenzene, trans-1,2-dichloroethane, total xylenes, 1,1-dichloroethane, 1,2-dichloroethane, dichlorofluoromethane, 1,2-diethoxyethane and di-isopropyl ether.

Del Val Ink is not presently suspected to be a source of any of these compounds.

Subsection 6 (pages 7 and 8) addresses the likelihood of Del Val being a source of chloroethane found in the ground water. The comment notes that Del Val has reportedly never used chloroethane. The comment also compares the average chloroethane concentration in the monitoring wells at Del Val (20.0 ppb) with the concentration in an upgradient monitoring well (A1S at 55 ppb) and a well cross gradient (C7M at 2J ppb).

The basis for the conclusion that Del Val may contribute chloroethane has previously been presented (CDM FPC, June 1990, page 19) and is as follows:

- o The concentration of chloroethane is higher in monitoring well A-6S than in A-6M. The higher concentrations in the shallow aquifer suggest a local source. This pattern is in contrast with that found for the other chemicals found at the A-6 cluster. The other chemicals were found in higher concentrations in the deeper (semi-artesian aquifer) suggesting a more distant source.
- o Chloroethane was not detected in well C-6S upgradient of A-6. This is in contrast to the other chemicals found at the A-6 cluster, which were found in high concentrations at C-6S and are believed to be from the landfill.
- o Most of the other chemicals found in the A-6 cluster were detected in the landfill gas vent wells, while chloroethane was not.

The pattern of chloroethane contamination deviates from the pattern of all the other chemicals found in that portion of the site, suggesting a separate source. The higher level in A-6S suggested a local source, ie, Del Val. It should be noted that chloroethane contamination at other parts of the site is attributed to the SLI landfill.

Section 4.0 (page 10) of the SMC report addresses air sampling conducted at the site and states that without knowing the prevailing wind direction it is difficult to pinpoint the possible source of methylene chloride. The report also states that the source of contamination at Station 3 (Del Val) would be Station 5 (SLI landfill) because the concentration at Station 5 is higher than at Station 3.

(TV 28/17)

CDM agrees that it is difficult to determine the source or sources of methylene chloride in the air from the available data. However, it should be noted that personnel conducting the field activities notices organic vapor odors in the indoor air in the Del Val plant, as well as outside the plant building.

Section 5.0 states that all ground water contamination "can more logically be attributed to sources other than Del Val".

It is CDM's opinion that chloroethane contamination found in wells A-6S and A-6M, located on Del Val property can most likely be attributed to Del Val, while chloroethane contamination found in other areas is not attributed to Del Val.

Section 7.0 reviews the 1983 and 1985 annual reports for Sanitary Landfill Inc. by Geraghty & Miller (G&M), and discusses hydrogeological and ground water quality findings with focus on the Del Val facility.

In general, the review conducted by SMC utilizes the ground water flow direction found by G&M. This has been documented to be incorrect (CDM FPC, June 1990, page 4). G&M utilized GM-1D as a semi-artesian well, however data obtained in RI indicates it is a perched zone well. Ground water flow directions using water levels from GM-1D are skewed to the south. In addition, GM-8D is also screened in the perched zone, although designated by G&M as a semi-artesian zone well. The discussion of ground water quality and flow direction by SMC is based on the incorrect designation of these wells as screening the semi-artesian zone. Any such discussions of the semi-artesian aquifer including wells GM-8D and GM-1D will be misleading and incorrect as these wells actually represent perched water.

In addition, the discussion of GM-10 in section 7.2.2 and 7.3.1 is misleading as the well is referred to as downgradient from Del Val. This well, as acknowledged by SMC, is within the perched zone. No flow direction within the perched zone has been determined, therefore its relationship to Del Val's location with respect to ground water flow is unknown.



JAMES W. BRADFORD, JR.

August 25, 1990

VICE PRESIDENT AND GENERAL COUNSEL

Mr. Trevor Anderson
Remedial Project Manager
U.S. Environmental Protection Agency
Room 711
26 Federal Plaza
New York, New York 10278

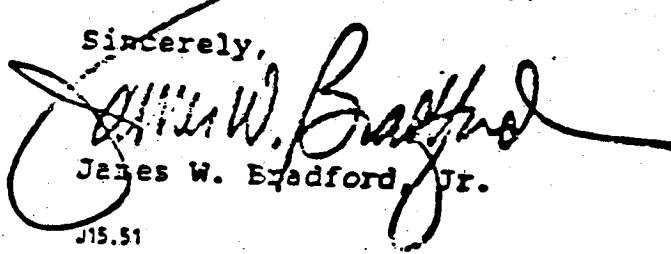
Re: Cinnaminson Groundwater Contamination Site

Dear Mr. Anderson

This letter sets forth in summary form the comments of AFG Industries, Inc. concerning the proposed plan of remediation for the Cinnaminson Groundwater Contamination Site (hereinafter the "Site"). While AFG Industries, Inc. desirous of protecting the public health of area residents and persons coming in contact with the Site, we do not believe it necessary to effectuate the actions described as Alternative MM-5 in the publication dated May 1990. It appears that treatment of all groundwater will be the most expensive Alternative and likely unnecessary to actually protect the public interest in question. Further, we believe that implementation of Alternative MM-5 is contrary to the National Contingency Plan.

We would suggest re-examination of the proposed Alternatives and implementation of the least cost Alternative necessary to protect the public health and environment. AFG Industries, Inc. is not a contributor to the contamination of or in any way connected with the Site, but makes these comments as an interested citizen. I request this letter be made part of the Administrative Record and that AFG be advised of any modification or amendment to the remedial action proposed by EPA. Thank you for your assistance.

Sincerely,


James W. Bradford, Jr.

J15.51

AFG Industries Inc.

P O BOX 929, KINGSPORT, TENNESSEE 37662. (615) 229-7200

June 23, 1990

U. S. Environmental Protection Agency
N. J. Remedial Action Branch
26 Federal Plaza, Room 711
New York, N.Y. 10278

Att. Mr. Trevor Anderson
Re: The Cinnaminson Ground Water
Contamination Site in Burlington
County, N. J.

Dear Mr. Anderson,

Our property directly adjoins the Sanitary landfill at the very end of Grinding Balls Lane. When we built our plant 35 years ago the level of the landfill was about 20 ft. below the normal contour of the land in this area. The area south of us was still a sand hole, containing some water - I suppose ground water. No water was available for a surface well and we were advised by Artesian well drillers that no water was available in deeper areas. This was borne out when Public Service Electric & Gas Co. tried drilling north of us and south of us with no result. We allowed them to tap into our line running to Union Landing Road where city water is available.

Our plant has no underground tanks and does not discharge any toxic materials above or below ground - with one exception - for our toilets.

I doubt if you are ever going to get good clean ground water in this area as long as it co-mingles with the landfill ground water.

We have heard many stories about trucks entering the landfill at night and dumping loads, undoubtedly toxic. I have never witnessed this but it came from those living on Union Landing Road.

Call me if I can be of any further help.

Sincerely,

Harold J. Winkelspacht
Harold J. Winkelspacht, Pres.

PEPPER, HAMILTON & SCHEETZ

ATTORNEYS AT LAW

WASHINGTON, D.C.
NEW YORK, NEW YORK
HARRISBURG, PENNSYLVANIA

WRITER'S DIRECT NUMBER

3000 TWO LOGAN SQUARE
EIGHTEENTH & ARCH STREETS
PHILADELPHIA, PENNSYLVANIA 19103-2788

215-981-4000

FAX: 215-981-4750 • TWX: 710-870-0777

DETROIT, MICHIGAN
LOS ANGELES, CALIFORNIA
BERWYN, PENNSYLVANIA
WILMINGTON, DELAWARE
LONDON, ENGLAND

(215) 981-4255

July 27, 1990

U.S. Environmental Protection Agency
New Jersey Remedial Action Board
26 Federal Plaza, Room 711
New York, NY 10287
Attn: Mr. Trevor Anderson

Re: Cinnaminson Ground Water Contamination Site

Dear Mr. Anderson:

As reflected in Katherine Laird's letter of July 23, it appears that Chemical Leaman has been incorrectly identified as a potentially responsible party at the Cinnaminson Ground Water Contamination Site. Chemical Leaman does have some limited comments regarding the Proposed Plan, however, which it would like to add to comments of other parties.

It is our belief that inadequate consideration has been given to use of soil vapor extraction. Additionally, it does appear that volatiles are the agency's concern. Volatiles have been effectively dealt with through bioremedial techniques at other sites.

As you may know, by October 18, 1989 memo, Jonathan Cannon, then Acting Assistant Administrator of EPA, warned against the full scale implementation of pump and treat as recommended in the Proposed Plan. That memo, a copy of which is attached, recommends a phased approach to pump and treat and "equal detail" to alternative remedies (see pg. 5). Additionally, he recommends obtaining additional data to better assess the likely response of ground water to extraction. I

PEPPER HAMILTON & SCHEETZ

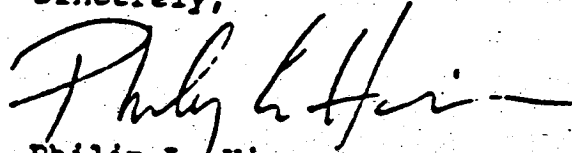
U.S. Environmental Protection Agency

Page 2

July 27, 1990

would suggest that the Proposed Plan be reviewed with Mr. Cannon's comments in mind.

Sincerely,

A handwritten signature in dark ink, appearing to read "Philip L. Hinerman", with a long horizontal flourish extending to the right.

Philip L. Hinerman

PLH/bab

cc: Robert Shertz

Katherine K. Laird, Esquire



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON DC 20460

OCT 18 1989

Directive No. 9355.4-01

0300

MEMORANDUM

SUBJECT: Considerations in Ground Water Remediation at Superfund Sites

FROM: Jonathan Z. Cannon
Acting Assistant Administrator

TO: Waste Management Division Directors
Regions I, IV, V, VI, VII, VIII
Emergency and Remedial Response Division Director
Region II
Hazardous Waste Management Division Directors
Region III, IX
Hazardous Waste Division Director
Region X

Purpose

The purpose of this memorandum is to transmit our findings from a recently completed study of several sites where ground water extraction is being conducted to contain or reduce levels of contaminants in the ground water. In addition, this memorandum presents several recommendations for modifying the Superfund approach to ground water remediation.

Background

The most common method for restoring contaminated ground water is extraction and treatment of contaminated ground water. Recent research has suggested that in many cases, it may be more difficult than is often estimated to achieve cleanup concentration goals in ground water. In response to these findings, the Office of Emergency and Remedial Response (OERR) initiated a project to assess the effectiveness of ground water extraction systems in achieving specified goals. Nineteen case studies were developed from among Superfund and State-lead sites, RCRA and Federal facilities. These sites were selected primarily on the basis that the ground water extraction systems had been operating for a period of time sufficiently long to allow for an evaluation of the system.

Objective

The objective of this memorandum is to describe the findings of this study and to recommend the consideration of certain factors and approaches in developing and implementing ground water response actions at Superfund sites.

Findings of Study

Several trends were identified from the case studies:

- o The extraction systems are generally effective in containing contaminant plumes, thus preventing further migration of contaminants.
- o Significant mass removal of contaminants (up to 130,000 pounds over three years) is being achieved.
- o Concentrations of contaminants have generally decreased significantly after initiation of extraction but have tended to level off after a period of time. At the sites examined, this leveling off usually began to occur at concentrations above the cleanup goal concentrations expected to have been attained at that particular point in time.
- o Data collection was usually not sufficient to fully assess contaminant movement and system response to extraction.

Several factors appear to be limiting the effectiveness of the extraction systems examined, including:

- o Hydrogeological factors, such as the heterogeneity of the subsurface, the presence of low permeability layers, and the presence of fractures;
- o Contaminant-related factors, such as sorption to the soil, and presence of non-aqueous phase liquids (dissolution from a separate non-aqueous phase or partitioning of contaminants from the residual non-aqueous phase);
- o Continued leaching from source areas;
- o System design parameters, such as pumping rate, screened interval, and location of extraction wells.

The report summarizing the study and findings, entitled Evaluation of Ground Water Extraction Remedies is attached. Additional copies of the report are available through the Public Information Center ((202) 382-2080) or the Center for

Environmental Research Information (EIS 684-7391 or (513) 569-
 1991.

Recommendations

The findings of the study substantiate previous research and confirm that ground water remediation is a very new, complex field. Based on this study, I am recommending consideration of certain factors and approaches in developing and implementing ground water response actions. The major recommendation is to orient our thinking so that we initiate early action on a small scale, while gathering more detailed data prior to committing to full-scale restoration. These recommendations are consistent with the Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites and do not alter Superfund's primary goal of returning ground water to its beneficial uses in a time frame that is reasonable given the particular site circumstances. The recommendations do, however, encourage the collection of data to allow for the design of an efficient cleanup approach that more accurately estimates the time frames required for remediation and the practicability of achieving cleanup goals.

While standard procedures for the more refined data collection techniques suggested below are being developed, it will be beneficial at most sites to implement the ground water remedy in stages. This might consist of operating an extraction system on a small scale that can be supplemented incrementally as information on aquifer response is obtained.

These recommendations are described further below. The attached flow chart illustrates how the recommendations fit into the Superfund ground water response process.

Recommendation 1: Initiate Response Action Early.

The bias for action should be considered early in the site management process. Response measures may be implemented to prevent further migration of contaminants if they will prevent the situation from getting worse, initiate risk reduction, and/or the operation of such a system would provide information useful to the design of the final remedy. Because the data needed to design a ground water containment system are often more limited than that needed to implement full remediation, it will in a number of cases be possible and valuable to prevent the contaminant plume from spreading while the investigation to select the remediation system progresses. The determination of whether to implement a containment system should be based on existing information, data defining the approximate plume boundaries, hydrologic data, contaminants present, and approximate concentrations, and best professional judgment. Examples of situations where this type of action will probably be warranted include sites where ground water plumes are migrating

rapidly (e.g., highly permeable aquifers, mobile contaminants, potential migration through fractures) and sites near drinking water wells that are potentially affected by the plume.

A Record of Decision (ROD) for an interim remedy may be prepared with a limited evaluation of alternatives that compares the advantages of taking an early action to the possible ramifications of waiting until the investigation has been completed. The evaluation of this action should be included as part of the stopping phase for the site and if determined to be appropriate, implemented while the overall RI/FS is underway. The RI/FS for the final action at the site should continue and incorporate information gained from this early action. If a containment action is implemented, the ground water flow should be monitored frequently, immediately before, during, and immediately after initiation of the action to obtain information on system response.

It is also advisable to implement ground water remediation systems in a staged process at sites where data collected during the remedial investigation did not clearly define the parameters necessary to optimize system design. This might consist of installing an extraction system in a highly contaminated area and observing the response of the aquifer and contaminant plume during implementation of the remedy. Based on the data gathered during this initial operation, the system could be modified and expanded as part of the remedial action phase to address the entire plume in the most efficient manner.

Recommendation 2: Provide Flexibility in the Selected Remedy to Modify the System Based on Information Gained During Its Operation.

In many cases it may not be possible to determine the ultimate concentration reductions achievable in the ground water until the ground water extraction system has been implemented and monitored for some period of time. Records of Decision should indicate the uncertainty associated with achieving cleanup goals in the ground water.

In general, RODs should indicate that the goal of the action is to return the ground water to its beneficial uses; i.e., health-based levels should be achieved for ground water that is potentially drinkable. In some cases, the uncertainty in the ability of the remedy to achieve this goal will be low enough that the final remedy can be specified without a contingency. However, in many cases, it may not be practicable to attain that goal, and thus it may be appropriate to provide in the ROD for a contingent remedy, or for the possibility that this may only be an interim ROD. Specifically, the ROD should discuss the possibility that information gained during the implementation of

the remedy may reveal that it is technically impracticable to achieve health-based concentrations throughout the area of attainment, and that another remedy or a contingent remedy may be needed.

Where sufficient information is available to specify an alternative or contingent remedy at the time of remedy selection, the ROD should discuss the contingency in equal detail to the primary remedial option, and should provide substantive criteria by which the Agency will decide whether or not to implement the contingency. See Interim Final Guidance on Preparing Superfund Decision Documents, OSWER Directive 9355.3-02 (May 1989), at page 9-17.1 The ROD may also discuss the possibility that an ARARS waiver will be invoked when MCLs or other Federal or State standards cannot practically be attained in the ground water; a written waiver finding should be issued at the time the contingency is invoked, or in limited circumstances, in the ROD itself.2

The public should be informed of the decision to invoke the contingency (and, perhaps, the waiver) through issuance of an Explanation of Significant Differences (ESD) which involves a public notice. A formal public comment period is not required when a decision is made to invoke a contingency specified in the ROD; however, the Region may decide to hold additional public comment periods pursuant to NCP section 300.825(b) (proposed) (Dec. 21, 1988, 53FR at 51516). In any event, the public may submit comments after ROD signature on any significant new information which "substantially support[s] the need to significantly alter the response action" NCP Section 300.825(c) (proposed).

There may also be situations where the Region finds that it is impracticable to achieve the levels set out in the ROD, but no contingency had been previously specified in the ROD. In such cases, a ROD amendment would be necessary to document fundamental changes that are made in the remedy based on the information gained during implementation; an ESD would be necessary to

1 For instance, the ROD may provide that a contingent remedy will be implemented if there is a levelling-off of contaminant concentrations despite continued ground water extraction over a stated period of time.

2 It may be possible to invoke a waiver at the time of ROD signature (a "contingent waiver") where, for example, the ROD is detailed and establishes an objective level or situation at which the waiver would be triggered. However, the use of contingent waivers should only be considered on a case-by-case basis after discussion with OERR/OWPE.

document significant but non-fundamental changes in the remedy based on the additional information.

For sites where there is substantial uncertainty regarding the ability of the remedy to return the ground water to its beneficial uses (e.g., dense non-aqueous phase liquids in fractured bedrock) it is appropriate to indicate that the initial action is interim with an ultimate remedy to be determined at some specified future date. The action should be designed to achieve the basic goal and carefully monitored over time to determine the feasibility of achieving this goal. In many of these cases, this can only be determined after several years of operation. The five year review may be the most appropriate time to make this evaluation. When sufficient data have been collected to specify the ultimate goal achievable at the site (e.g., first or second five year review), a final ROD for ground water would be prepared specifying the ultimate goal, including anticipated time frame, of the remedial action.

Although overall system parameters must be specified in the ROD, it is usually appropriate to design and implement the ground water response action as a phased process. An iterative process of system operation, evaluation, and modification during the construction phase can result in the optimum system design. Extraction wells might be installed incrementally and observed for one to three months to determine their effectiveness. This will help to identify appropriate locations for additional wells and can assure proper sizing of the treatment systems as the range of contaminant concentrations in extracted ground water is confirmed.

If it is determined that some portion of the ground water within the area of attainment cannot be returned to its beneficial uses, an evaluation of an alternate goal for the ground water should be made. Experience to date on this phase of ground water remediation is extremely limited and more definitive guidance on when to terminate ground water extraction will be provided later. When the point at which contaminant concentrations in ground water level off, however, this should be viewed as a signal that some re-evaluation of the remedy is warranted. In many cases, operation of the extraction system on an intermittent basis will provide the most efficient mass removal. This allows contaminants to desorb from the soil in the saturated zone before ground water is extracted providing for maximum removal of contaminant mass per volume of ground water removed.

Ground water monitoring should continue for two to three years after active remediation measures have been completed to ensure that contaminant levels do not recover. For cases where contaminants remain above health-based levels, reviews to ensure

that protection is being maintained at the site will take place at least every five years.

Recommendation 3: Collect Data to Better Assess Contaminant Movement and Likely Response of Ground Water to Extraction.

In addition to the traditional plume characterization data normally collected, the following data is of particular importance to the design and evaluation of ground water remedies and should be considered in scoping ground water RI/FSs. Assessments of contaminant movement and extraction effectiveness can be greatly enhanced by collecting more detailed information on vertical variations in stratigraphy and correlating this to contaminant concentrations in the soil during the remedial investigation. More frequent coring during construction of monitoring wells and the use of field techniques to assess relative contaminant concentrations in the cores are methods that may be used to gain this information. More detailed analysis of contaminant sorption to soil in the saturated zone can also provide the basis for estimating the time frame for reducing contaminant concentrations to established levels and identifying the presence of non-aqueous phase liquids. Cores taken from depths where relatively high concentrations of contaminants were identified might be analyzed to assess contaminant partitioning between the solid and aqueous phases. This might involve measuring the organic carbon content and/or the concentration of the contaminants themselves.

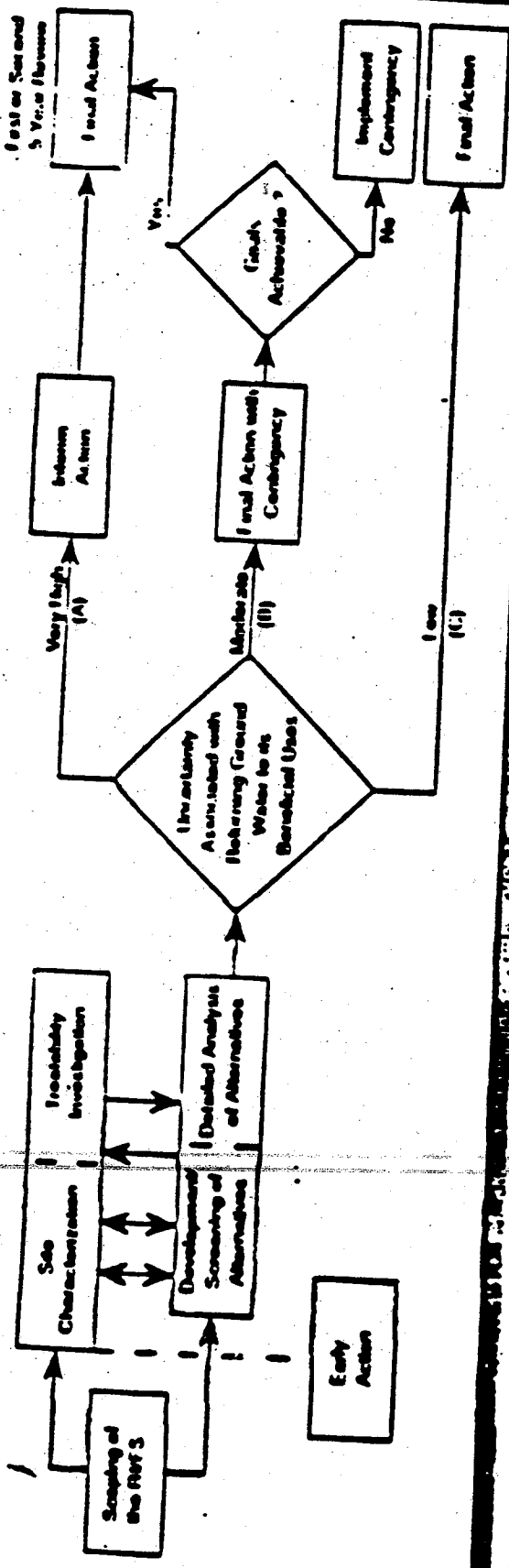
The long-term goal is to collect this information during the RI so that more definitive decisions can be made at the ROD stage. Standardized sampling and analytical methods to support these analyses are currently being evaluated.

For further information, please consult the appropriate Regional Ground Water Forum member, Jennifer Haley at FTS 475-6705 or Caroline Roe at FTS 475-9754 in OERR's Hazardous Site Control Division, or Dick Scalf at the Robert S. Kerr Environmental Research Laboratory (FTS 743-2308)

**Attachment: Flow Chart
Summary Report**

**cc: Superfund Branch Chiefs, Regions I - X
Superfund Section Chiefs, Regions I - X w/sunmary report**

Phase:



Actions:

- Identify data collection needs
- Identify possible containment action
- Install ground water collection in phased process
- Monitor aquifer response
- Design and implement ground water extraction system in phased process
- Monitor aquifer response
- Evaluate data from system operation
- Determine practicable goals
- Identify any areas where long term withdrawal controls will be necessary

Administrative Considerations:

ROD (Early Action)

- A) ROD (Interim Remedial)
- B) ROD (Contingency)
- C) ROD (Final)
- A) ROD (Final)
- B) ESD or ROD amendment

Enforcement Considerations:

Negative RW 3 Sample:

- Data collection
- Early action

Negative Contingency Decision

- A) Negative Contingency Decision
- B) Possible separation or amendment to Contingency Decision

RE-QUALITY

APPENDIX B

Figure 1: Cinnaminson Ground Water Contamination Site

